Encyclopædia of Religion and Ethics

EDITED BY

JAMES HASTINGS

WITH THE ASSISTANCE OF

JOHN A. SELBIE, M.A., D.D.

PROFESSOR OF OLD TESTAMENT LANGUAGE AND LITERATURE IN THE UNITED FREE CHURCH COLLEGE, ABERDEEN

AND

LOUIS H. GRAY, M.A., Ph.D.

SOMETIME FELLOW IN INDO-IRANIAN LANGUAGES IN COLUMBIA UNIVERSITY, NEW YORK

VOLUME III

BURIAL—CONFESSIONS

NEW YORK

CHARLES SCRIBNER'S SONS

PRINTED IN GREAT BRITAIN BY
MORRISON AND GIBB LIMITED

LISTS OF ABBREVIATIONS

I. General

A.H. = Anno Hijrae (A.D. 622).
Ak. = Akkadian.
Alex. = Alexandrian.
Amer. = American.
Apoc. = Apocalypse, Apocalyptic.
Apocr. = Apocrypha.
Aq. = Aquila.
Arab. = Arabic.
Aram. = Aramaic.
Arm. = Armenian.
Ary. = Aryan.
As. = Asiatic.
Assyr. = Assyrian.
AT = Altes Testament.
AV = Authorized Version.
AVm = Authorized Version margin.
A.Y. = Anno Yazdagird (A.D. 639).
Bab. = Babylonian.
c. = *circa*, about.
Can. = Canaanite.
cf. = compare.
ct. = contrast.
D = Deuteronomist.
E = Elohist.
edd. = editions or editors.
Egyp. = Egyptian.
Eng. = English.
Eth. = Ethiopic.
EV, EVV = English Version, Versions.
f. = and following verse or page.
ff. = and following verses or pages.
Fr. = French.
Germ. = German.
Gr. = Greek.
H = Law of Holiness.
Heb. = Hebrew.
Hel. = Hellenistic.
Hex. = Hexateuch.
Himy. = Himyaritic.
Ir. = Irish.
Iran. = Iranian.
Isr. = Israelite.
J = Jahwist.
J" = Jehovah.
Jerus. = Jerusalem.
Jos. = Josephus.
LXX = Septuagint.
Min. = Minæan.
MSS = Manuscripts.
MT = Massoretic Text.
n. = note.
NT = New Testament.
Onḳ. = Onḳelos.
OT = Old Testament.
P = Priestly Narrative.
Pal. = Palestine, Palestinian.
Pent. = Pentateuch.
Pers. = Persian.
Phil. = Philistine.
Phœn. = Phœnician.
Pr. Bk. = Prayer Book.
R = Redactor.
Rom. = Roman.
RV = Revised Version.
RVm = Revised Version margin.
Sab. = Sabæan.
Sam. = Samaritan.
Sem. = Semitic.
Sept. = Septuagint.
Sin. = Sinaitic.
Skr. = Sanskrit.
Symm. = Symmachus.
Syr. = Syriac.
t. (following a number) = times.
Talm. = Talmud.
Targ. = Targum.
Theod. = Theodotion.
TR = Textus Receptus, Received Text.
tr. = translated or translation.
VSS = Versions.
Vulg., Vg. = Vulgate.
WH = Westcott and Hort's text.

II. Books of the Bible

Old Testament.

Gn = Genesis.
Ex = Exodus.
Lv = Leviticus.
Nu = Numbers.
Dt = Deuteronomy.
Jos = Joshua.
Jg = Judges.
Ru = Ruth.
1 S, 2 S = 1 and 2 Samuel.
1 K, 2 K = 1 and 2 Kings.
1 Ch, 2 Ch = 1 and 2 Chronicles.
Ezr = Ezra.
Neh = Nehemiah.
Est = Esther.
Job.
Ps = Psalms.
Pr = Proverbs.
Ec = Ecclesiastes.
Ca = Canticles.
Is = Isaiah.
Jer = Jeremiah.
La = Lamentations.
Ezk = Ezekiel.
Dn = Daniel.
Hos = Hosea.
Jl = Joel.
Am = Amos.
Ob = Obadiah.
Jon = Jonah.
Mic = Micah.
Nah = Nahum.
Hab = Habakkuk.
Zeph = Zephaniah.
Hag = Haggai.
Zec = Zechariah.
Mal = Malachi.

Apocrypha.

1 Es, 2 Es = 1 and 2 Esdras.
To = Tobit.
Jth = Judith.
Ad. Est = Additions to Esther.
Wis = Wisdom.
Sir = Sirach or Ecclesiasticus.
Bar = Baruch.
Three = Song of the Three Children.
Sus = Susanna.
Bel = Bel and the Dragon.
Pr. Man = Prayer of Manasses.
1 Mac, 2 Mac = 1 and 2 Maccabees.

New Testament.

Mt = Matthew.
Mk = Mark.
Lk = Luke.
Jn = John.
Ac = Acts.
Ro = Romans.
1 Co, 2 Co = 1 and 2 Corinthians.
Gal = Galatians.
Eph = Ephesians.
Ph = Philippians.
Col = Colossians.
1 Th, 2 Th = 1 and 2 Thessalonians.
1 Ti, 2 Ti = 1 and 2 Timothy.
Tit = Titus.
Philem = Philemon.
He = Hebrews.
Ja = James.
1 P, 2 P = 1 and 2 Peter.
1 Jn, 2 Jn, 3 Jn = 1, 2, and 3 John.
Jude.
Rev = Revelation.

III. For the Literature

1. The following authors' names, when unaccompanied by the title of a book, stand for the works in the list below.

Baethgen = *Beiträge zur sem. Religionsgesch.*, 1888.
Baldwin = *Dict. of Philosophy and Psychology*, 3 vols. 1901–05.
Barth = *Nominalbildung in den sem. Sprachen*, 2 vols. 1889, 1891 ([2]1894).
Benzinger = *Heb. Archäologie*, 1894.
Brockelmann = *Gesch. d. arab. Litteratur*, 2 vols. 1897–1902.
Bruns-Sachau = *Syr.-Röm. Rechtsbuch aus dem fünften Jahrhundert*, 1880.
Budge = *Gods of the Egyptians*, 2 vols. 1903.
Daremberg-Saglio = *Dict. des ant. grec. et rom.*, 1886–90.
De la Saussaye = *Lehrbuch der Religionsgesch.*[3], 1905.
Denzinger = *Enchiridion Symbolorum*[11], Freiburg im Br., 1911.
Deussen = *Die Philos. d. Upanishads*, 1899 [Eng. tr., 1906].
Doughty = *Arabia Deserta*, 2 vols. 1888.
Grimm = *Deutsche Mythologie*[4], 3 vols. 1875–78, Eng. tr. *Teutonic Mythology*, 4 vols. 1882–88.
Hamburger = *Realencyclopädie für Bibel u. Talmud*, i. 1870 ([2]1892), ii. 1883, suppl. 1886, 1891 f., 1897.
Holder = *Altceltischer Sprachschatz*, 1891 ff.
Holtzmann-Zöpffel = *Lexicon f. Theol. u. Kirchenwesen*[2], 1895.
Howitt = *Native Tribes of S.E. Australia*, 1904.
Jubainville = *Cours de Litt. celtique*, i.–xii., 1883 ff.
Lagrange = *Études sur les religions sémitiques*[2], 1904.
Lane = *An Arabic-English Lexicon*, 1863 ff.
Lang = *Myth, Ritual, and Religion*[2], 2 vols. 1899.
Lepsius = *Denkmäler aus Aegypten u. Aethiopien*, 1849–60.
Lichtenberger = *Encyc. des sciences religieuses*, 1876.
Lidzbarski = *Handbuch der nordsem. Epigraphik*, 1898.
McCurdy = *History, Prophecy, and the Monuments*, 2 vols. 1894–96.
Muir = *Orig. Sanskrit Texts*, 1858–72.
Muss-Arnolt = *A Concise Dict. of the Assyrian Language*, 1894 ff.
Nowack = *Lehrbuch d. heb. Archäologie*, 2 vols. 1894.
Pauly-Wissowa = *Realencyc. der classischen Altertumswissenschaft*, 1894 ff.
Perrot-Chipiez = *Hist. de l'art dans l'antiquité*, 1881 ff.
Preller = *Römische Mythologie*, 1858.
Réville = *Religion des peuples non-civilisés*, 1883.
Riehm = *Handwörterbuch d. bibl. Altertums*[2], 1893–94.
Robinson = *Biblical Researches in Palestine*[2], 1856.
Roscher = *Lex. d. gr. u. röm. Mythologie*, 1884 ff.
Schaff-Herzog = *The New Schaff-Herzog Encyclopedia of Religious Knowledge*, 1908 ff.
Schenkel = *Bibel-Lexicon*, 5 vols. 1869–75.
Schürer = *GJV*[3], 3 vols. 1898–1901 [*HJP*, 5 vols. 1890 ff.].
Schwally = *Leben nach dem Tode*, 1892.
Siegfried-Stade = *Heb. Wörterbuch zum AT*, 1893.
Smend = *Lehrbuch der alttest. Religionsgesch.*[2], 1899.
Smith (G. A.) = *Historical Geography of the Holy Land*[4], 1897.
Smith (W. R.) = *Religion of the Semites*[2], 1894.
Spencer (H.) = *Principles of Sociology*[3], 1885–96.
Spencer-Gillen[a] = *Native Tribes of Central Australia*, 1899.
Spencer-Gillen[b] = *Northern Tribes of Central Australia*, 1904.
Swete = *The OT in Greek*, 3 vols. 1893 ff.
Tylor (E. B.) = *Primitive Culture*[3], 1891 [[4]1903].
Ueberweg = *Hist. of Philosophy*, Eng. tr., 2 vols. 1872–74.
Weber = *Jüdische Theologie auf Grund des Talmud u. verwandten Schriften*[2], 1897.
Wiedemann = *Die Religion der alten Aegypter*, 1890 [Eng. tr., revised, *Religion of the Anc. Egyptians*, 1897].
Wilkinson = *Manners and Customs of the Ancient Egyptians*, 3 vols. 1878.
Zunz = *Die gottesdienstlichen Vorträge der Juden*[2], 1892.

2. Periodicals, Dictionaries, Encyclopædias, and other standard works frequently cited.

AA = Archiv für Anthropologie.
AAOJ = American Antiquarian and Oriental Journal.
ABAW = Abhandlungen d. Berliner Akad. d. Wissenschaften.
AE = Archiv für Ethnographie.
AEG = Assyr. and Eng. Glossary (Johns Hopkins University).
AGG = Abhandlungen der Göttinger Gesellschaft der Wissenschaften.
AGPh = Archiv für Geschichte der Philosophie.
AHR = American Historical Review.
AHT = Ancient Hebrew Tradition (Hommel).
AJPh = American Journal of Philology.
AJPs = American Journal of Psychology.
AJRPE = American Journal of Religious Psychology and Education.
AJSL = American Journal of Semitic Languages and Literature.
AJTh = American Journal of Theology.
AMG = Annales du Musée Guimet.
APES = American Palestine Exploration Society.
APF = Archiv für Papyrusforschung.
AR = Anthropological Review.
ARW = Archiv für Religionswissenschaft.
AS = Acta Sanctorum (Bollandus).
ASG = Abhandlungen der Sächsischen Gesellschaft der Wissenschaften.
ASoc = L'Anuée Sociologique.
ASWI = Archæological Survey of W. India.
AZ = Allgemeine Zeitung.
BAG = Beiträge zur alten Geschichte.
BASS = Beiträge zur Assyriologie u. sem. Sprachwissenschaft (edd. Delitzsch and Haupt).
BCH = Bulletin de Correspondance Hellénique.
BE = Bureau of Ethnology.
BG = Bombay Gazetteer.
BJ = Bellum Judaicum (Josephus).
BL = Bamptou Lectures.
BLE = Bulletin de Littérature Ecclésiastique.
BOR = Bab. and Oriental Record.
BS = Bibliotheca Sacra.
BSA = Annual of the British School at Athens.
BSAA = Bulletin de la Soc. archéologique à Alexandrie.
BSAL = Bulletin de la Soc. d'Anthropologie de Lyon.
BSAP = Bulletin de la Soc. d'Anthropologie, etc., Paris.
BSG = Bulletin de la Soc. de Géographie.
BTS = Buddhist Text Society.
BW = Biblical World.
BZ = Biblische Zeitschrift.

CAIBL = Comptes rendus de l'Académie des Inscriptions et Belles-Lettres.
CBTS = Calcutta Buddhist Text Society.
CE = Catholic Encyclopædia.
CF = Childhood of Fiction (MacCulloch).
CGS = Cults of the Greek States (Farnell).
CI = Census of India.
CIA = Corpus Inscrip. Atticarum.
CIE = Corpus Inscrip. Etruscarum.
CIG = Corpus Inscrip. Græcarum.
CIL = Corpus Inscrip. Latinarum.
CIS = Corpus Inscrip. Semiticarum.
COT = Cuneiform Inscriptions and the OT [Eng. tr. of *KAT*²; see below].
CR = Contemporary Review.
CeR = Celtic Review.
ClR = Classical Review.
CQR = Church Quarterly Review.
CSEL = Corpus Script. Eccles. Latinorum.
DAC = Dict. of the Apostolic Church.
DACL = Dict. d'Archéologie chrétienne et de Liturgie (Cabrol).
DB = Dict. of the Bible.
DCA = Dict. of Christian Antiquities (Smith-Cheetham).
DCB = Dict. of Christian Biography (Smith-Wace).
DCG = Dict. of Christ and the Gospels.
DI = Dict. of Islam (Hughes).
DNB = Dict. of National Biography.
DPhP = Dict. of Philosophy and Psychology.
DWAW = Denkschriften der Wiener Akad. der Wissenschaften.
EBi = Encyclopædia Biblica.
EBr = Encyclopædia Britannica.
EEFM = Egyp. Explor. Fund Memoirs.
EI = Encyclopaedia of Islām.
ERE = The present work.
Exp = Expositor.
ExpT = Expository Times.
FHG = Fragmenta Historicorum Græcorum (coll. C. Müller, Paris, 1885).
FL = Folklore.
FLJ = Folklore Journal.
FLR = Folklore Record.
GA = Gazette Archéologique.
GB = Golden Bough (Frazer).
GGA = Göttingische Gelehrte Anzeigen.
GGN = Göttingische Gelehrte Nachrichten (Nachrichten der königl. Gesellschaft der Wissenschaften zu Göttingen).
GIAP = Grundriss d. Indo-Arischen Philologie.
GIrP = Grundriss d. Iranischen Philologie.
GJV = Geschichte des jüdischen Volkes.
GVI = Geschichte des Volkes Israel.
HAI = Handbook of American Indians.
HDB = Hastings' Dict. of the Bible.
HE = Historia Ecclesiastica.
HGHL = Historical Geography of the Holy Land (G. A. Smith).
HI = History of Israel.
HJ = Hibbert Journal.
HJP = History of the Jewish People.
HL = Hibbert Lectures.
HN = Historia Naturalis (Pliny).
HWB = Handwörterbuch.
IA = Indian Antiquary.
ICC = International Critical Commentary.
ICO = International Congress of Orientalists.
ICR = Indian Census Report.
IG = Inscrip. Græcæ (publ. under auspices of Berlin Academy, 1873 ff.).
IGA = Inscrip. Græcæ Antiquissimæ.
IGI = Imperial Gazetteer of India² (1885); new edition (1908–09).
IJE = International Journal of Ethics.
ITL = International Theological Library.
JA = Journal Asiatique.
JAFL = Journal of American Folklore.
JAI = Journal of the Anthropological Institute.
JAOS = Journal of the American Oriental Society.
JASB = Journal of the Anthropological Society of Bombay.
JASBe = Journ. of As. Soc. of Bengal.
JBL = Journal of Biblical Literature.
JBTS = Journal of the Buddhist Text Society.
JD = Journal des Débats.
JDTh = Jahrbücher f. deutsche Theologie.
JE = Jewish Encyclopedia.
JGOS = Journal of the German Oriental Society.
JHC = Johns Hopkins University Circulars.
JHS = Journal of Hellenic Studies.
JLZ = Jenäer Litteraturzeitung.
JPh = Journal of Philology.
JPTh = Jahrbücher für protestantische Theologie.
JPTS = Journal of the Pāli Text Society.
JQR = Jewish Quarterly Review.
JRAI = Journal of the Royal Anthropological Institute.
JRAS = Journal of the Royal Asiatic Society.
JRASBo = Journal of the Royal Asiatic Society, Bombay branch.
JRASC = Journal of the Royal Asiatic Society, Ceylon branch.
JRASK = Journal of the Royal Asiatic Society, Korean branch.
JRGS = Journal of the Royal Geographical Society.
JRS = Journal of Roman Studies.
JThSt = Journal of Theological Studies.
*KAT*² = Die Keilinschriften und das AT² (Schrader), 1883.
*KAT*³ = Zimmern-Winckler's ed. of the preceding (really a totally distinct work), 1903.
KB or *KIB* = Keilinschriftliche Bibliothek (Schrader), 1889 ff.
KGF = Keilinschriften und die Geschichtsforschung, 1878.
LCBl = Literarisches Centralblatt.
LOPh = Literaturblatt für Oriental. Philologie.
LOT = Introduction to Literature of OT (Driver).
LP = Legend of Perseus (Hartland).
LSSt = Leipziger sem. Studien.
M = Mélusine.
MAIBL = Mémoires de l'Acad. des Inscriptions et Belles-Lettres.
MBAW = Monatsbericht d. Berliner Akad. d. Wissenschaften.
MGH = Monumenta Germaniæ Historica (Pertz).
MGJV = Mittheilungen der Gesellschaft für jüdische Volkskunde.
MGWJ = Monatsschrift für Geschichte und Wissenschaft des Judentums.
MI = Origin and Development of the Moral Ideas (Westermarck).
MNDPV = Mittheilungen u. Nachrichten des deutschen Palästina-Vereins.
MR = Methodist Review.
MVG = Mittheilungen der vorderasiatischen Gesellschaft.
MWJ = Magazin für die Wissenschaft des Judentums.
NBAC = Nuovo Bullettino di Archeologia Cristiana.
NC = Nineteenth Century.
NHWB = Neuhebräisches Wörterbuch.
NINQ = North Indian Notes and Queries.
NKZ = Neue kirchliche Zeitschrift.
NQ = Notes and Queries.
NR = Native Races of the Pacific States (Bancroft).
NTZG = Neutestamentliche Zeitgeschichte.
OED = Oxford English Dictionary.
OLZ = Orientalische Litteraturzeitung.
OS = Onomastica Sacra.
OTJC = Old Testament in the Jewish Church (W. R. Smith).
OTP = Oriental Translation Fund Publications.
PAOS = Proceedings of American Oriental Society.

PASB = Proceedings of the Anthropological Soc. of Bombay.
PB = Polychrome Bible (English).
PBE = Publications of the Bureau of Ethnology.
PC = Primitive Culture (Tylor).
PEFM = Palestine Exploration Fund Quarterly Memoirs.
PEFSt = Palestine Exploration Fund Statement.
PG = Patrologia Græca (Migne).
PJB = Preussische Jahrbücher.
PL = Patrologia Latina (Migne).
PNQ = Punjab Notes and Queries.
PR = Popular Religion and Folklore of N. India (Crooke).
PRE^3 = Prot. Realencyclopädie (Herzog-Hauck).
PRR = Presbyterian and Reformed Review.
PRS = Proceedings of the Royal Society.
PRSE = Proceedings Royal Soc. of Edinburgh.
PSBA = Proceedings of the Society of Biblical Archæology.
PTS = Pāli Text Society.
RA = Revue Archéologique.
RAnth = Revue d'Anthropologie.
RAS = Royal Asiatic Society.
RAssyr = Revue d'Assyriologie.
RB = Revue Biblique.
RBEW = Reports of the Bureau of Ethnology (Washington).
RC = Revue Critique.
RCel = Revue Celtique.
RCh = Revue Chrétienne.
RDM = Revue des Deux Mondes.
RE = Realencyclopädie.
REG = Revue des Études Grecques.
REg = Revue Égyptologique.
REJ = Revue des Études Juives.
REth = Revue d'Ethnographie.
RGG = Die Religion in Geschichte und Gegenwart.
RHLR = Revue d'Histoire et de Littérature religieuses.
RHR = Revue de l'Histoire des Religions.
RMM = Revue du monde musulman.
RN = Revue Numismatique.
RP = Records of the Past.
RPh = Revue Philosophique.
RQ = Römische Quartalschrift.
RS = Revue sémitique d'Épigraphie et d'Hist. ancienne.
RSA = Recueil de la Soc. archéologique.
RSI = Reports of the Smithsonian Institution.
RTAP = Recueil de Travaux rélatifs à l'Archéologie et à la Philologie.
RTP = Revue des traditions populaires.
RThPh = Revue de Théologie et de Philosophie.
RTr = Recueil de Travaux.
RVV = Religionsgeschichtliche Versuche und Vorarbeitungen.
RWB = Realwörterbuch.
SBAW = Sitzungsberichte d. Berliner Akademie d. Wissenschaften.
SBB = Sacred Books of the Buddhists.
SBE = Sacred Books of the East.
SBOT = Sacred Books of the OT (Hebrew).
SDB = Single-vol. Dict. of the Bible (Hastings).
SK = Studien und Kritiken.
SMA = Sitzungsberichte d. Münchener Akademie.
SSGW = Sitzungsberichte d. Kgl. Sächs. Gesellsch. d. Wissenschaften.
SWAW = Sitzungsberichte d. Wiener Akademie d. Wissenschaften.
TAPA = Transactions of American Philological Association.
TASJ = Transactions of the Asiatic Soc. of Japan.
TC = Tribes and Castes.
TES = Transactions of Ethnological Society.
ThLZ = Theologische Litteraturzeitung.
ThT = Theol. Tijdschrift.
TRHS = Transactions of Royal Historical Society.
TRSE = Transactions of Royal Soc. of Edinburgh.
TS = Texts and Studies.
TSBA = Transactions of the Soc. of Biblical Archæology.
TU = Texte und Untersuchungen.
WAI = Western Asiatic Inscriptions.
WZKM = Wiener Zeitschrift f. Kunde des Morgenlandes.
ZA = Zeitschrift für Assyriologie.
ZÄ = Zeitschrift für ägyp. Sprache u. Altertumswissenschaft.
ZATW = Zeitschrift für die alttest. Wissenschaft.
ZCK = Zeitschrift für christliche Kunst.
ZCP = Zeitschrift für celtische Philologie.
ZDA = Zeitschrift für deutsches Altertum.
ZDMG = Zeitschrift der deutschen morgenländischen Gesellschaft.
ZDPV = Zeitschrift des deutschen Palästina-Vereins.
ZE = Zeitschrift für Ethnologie.
ZKF = Zeitschrift für Keilschriftforschung.
ZKG = Zeitschrift für Kirchengeschichte.
ZKT = Zeitschrift für kathol. Theologie.
ZKWL = Zeitschrift für kirchl. Wissenschaft und kirchl. Leben.
ZM = Zeitschrift für die Mythologie.
ZNTW = Zeitschrift für die neutest. Wissenschaft.
ZPhP = Zeitschrift für Philosophie und Pädagogik.
ZTK = Zeitschrift für Theologie und Kirche.
ZVK = Zeitschrift für Volkskunde.
ZVRW = Zeitschrift für vergleichende Rechtswissenschaft.
ZWT = Zeitschrift für wissenschaftliche Theologie.

[A small superior number designates the particular edition of the work referred to, as *KAT*^{2}, *LOT*^{6}, etc.]

history may be mentioned Yule cakes, made in the form of a child, Twelfth cakes, pancakes on Shrove Tuesday, cakes eaten on various Sundays in Lent (Mothering, Simnel, Whirlin cakes), hot cross buns on Good Friday, Easter cakes, Michaelmas cakes, Hallowe'en or All Souls' Day cakes. The Twelfth cake was divided into as many pieces as there were persons in the house. Portions also were assigned to Christ, the Virgin Mary, and the Magi, and these were given as alms. The member of the household who got the bean or piece of money hidden in the cake was hailed as king. In Devonshire, cakes were eaten and cider was drunk on Twelfth Day; parts of the cakes were presented to the apple and pear trees, and a libation of cider was poured over them. This was to secure a good crop (Chambers, *Book of Days*, 1865, i. 62–63; Brand, *op. cit.* i. 151 ff.). Older customs associated with wedding-cakes point to the connexion of this cake with some rite resembling the Roman *confarreatio* (Brand, *op. cit.* ii. 58). For many details regarding these cakes see Brand, *op. cit.*, and cf. the remarks of Grimm, *Teut. Myth.* 63, 501.

LITERATURE.—This is given in the course of the article.

J. A. MACCULLOCH.

CALAMITY.—See SUFFERING.

CALENDAR.

CALENDAR (Introductory).—By the term 'calendar' we understand the system by which days are named in relation to their place in larger units of time. In this sense the subdivision of the day into hours or other small units is independent of the calendar, while the era or other method by which years are named or numbered is also, as a rule, independent of it. Even the point from which the year is reckoned may be independent, and the Julian calendar has notoriously been used along with many different eras and many different New Year's Days. Wherever months have been used, the days have usually derived their names from their position in the months, and the system of reckoning months has therefore been a part of the calendar; but the months have sometimes been reckoned independently of the method of numbering the years, and even of the point from which each year has been made to run, so that the calendar is less concerned with the names of years than with the names of months.

1. **Natural phenomena on which calendars are based.**—The recurrence of day and night and the seasons of the year are so closely bound up with the conditions of human existence, that it is necessary for all men to have regard to them, and it is therefore natural that the day and year should be used everywhere as units for the measurement of time. The recurrence of the phases of the moon, governing as it does the supply of light at night, provides another measure which has been almost universally used from the earliest times, and the convenience of having a unit intermediate between the day and the year has led to the retention of the month, even where it has become an artificial unit independent of the phases of the moon. It is probable that the subdivision of the month has given us the week, though this again has become independent both of the moon and of the month.

2. **Elementary principles of calendar construction.**—It has been an almost universal practice to name or number the days according to their position in the month, and to name or number the months according to their position in the year. In order to do this it is convenient to have a fixed point for the beginning of each month, and a fixed point for the beginning of each year. Such a point is provided, in the case of the month, by the reappearance of the lunar crescent in the evening sky, after conjunction with the sun. This is what is known as the apparent new moon or phasis, and it probably served to mark the beginning of the month in all primitive calendars, and this phasis still regulates the beginning of the Muhammadan fast of Ramadān. But though Nature provides an obvious starting-point for the month, it is otherwise with the year. Except in extreme northerly and southerly latitudes, there is no annual return of the sun after a period of absence, corresponding to the monthly return of the moon; the seasons slide gradually one into another, and a definite starting-point must be obtained either artificially or by astronomical observation. The result is that early calendars, while, for the most part, adhering to the rule that the month must begin at the phasis, have no definite rule for the beginning of the year. The year had to begin at a fixed season, and was made to consist generally of twelve months, sometimes of thirteen months, so as to keep each month fixed to a particular season. The natural desire to make the calendar year correspond with the physical year was often seconded by the desire to connect some religious festival at once with a fixed day of the month (often the full moon, for the sake of evening light) and with a fixed season of the year. The earliest calendars were generally strictly empirical. The new month was determined by simple observation of the phasis, and the number of months in each year was settled from time to time by a civil or religious authority, which was in its turn guided by the state of the weather or of the crops. Father Kugler has shown (*ZA* xxii. [1908] p. 70) that this was the case in Babylonia in the time of the dynasty of Ur (26th–25th or 25th–24th cent. B.C.), as it was certainly the case with the Jews before the calendar reform of Hillel in the 4th cent. A.D. The great problem of ancient calendar-reformers was to discover a rule to determine which years were to contain twelve and which thirteen months, or, as it is more usually expressed, to discover a rule to govern intercalation, as the insertion of the thirteenth, or intercalary, month was called. As astronomical science developed, a second problem arose—that of finding a fixed rule to take the

place of observation in determining the duration of each month. In one or two cases the months were given an artificial length. Thus, in the Egyptian calendar (see CALENDAR [Egyptian]), which must be very ancient, though there is no evidence that it is as ancient as Ed. Meyer supposes (viz. 4241 B.C.), there are twelve months of thirty days each, and five additional days, making a year of the fixed duration of 365 days. On the other hand, the Romans had four months of 31 days, seven months of 29 days, and one month of 28 days, making a total duration of 355 days (approximately equal to twelve lunar months) for the year. When an intercalation was necessary, the Romans inserted 22 or 23 days only, so that the calendar months ceased to correspond with the lunar months. A further feature, peculiar to the Roman calendar, is the longer average duration of the six months from March to August than of the six months from September to February. This is merely an exaggeration of a natural phenomenon, the mean interval between conjunction and phasis being at its minimum at the vernal equinox in March and at its maximum at the autumnal equinox in September, so that the lunar months from March to August are on an average about eight hours longer than those from September to February.

3. The solar year and intercalation.—The oldest approximation to the length of the solar year, of which we have any knowledge, is the Egyptian calendar year of 365 days. It would appear, however, that the Egyptians were early acquainted with a more exact value. Of all the annual astronomical phenomena those most easily observed without instruments of measurement are the heliacal risings of the fixed stars. A star which rises in the daytime or shortly before sunrise is invisible, or visible only in the evening; at the end of this period of invisibility comes a day when the star can just be seen before it is lost in the morning twilight. This is called the heliacal rising of the star. The Egyptians specially observed the heliacal rising of Sirius, the brightest of the fixed stars, and reckoned the mean interval between one heliacal rising and the next at 365 days, 6 hours. Modern calculations have been unable to improve upon this value. We have several references to the date of the heliacal rising of Sirius, the oldest belonging to the reign of Senwosri III., about 1880 B.C. But, in spite of their knowledge of this more exact value for the year, the Egyptians continued to use the year of 365 days till after the introduction of the Julian calendar at Rome (see CALENDAR [Egyptian]). Where a lunar calendar was in use, the observation of annual astronomical phenomena was valuable for the regulation of intercalations, and must from an early date have been considered in addition to the state of the crops. Thus at Babylon the heliacal risings of different zodiacal stars and asterisms were observed, and some rules have come down to us for controlling intercalations in this way. But for the regulation of intercalations it was of more importance to determine the relative lengths of the natural year and natural month than the actual length of either. It would appear that as early as the 6th cent. B.C. a cycle of three intercalations in eight years was introduced both at Athens and at Babylon. Such a cycle assumed that the mean year contained $12\frac{3}{8}$ or 12·375 mean months. The most exact value that modern astronomy can give with certainty is 12·368267 for the number of mean lunar months in the tropical year, on which the seasons depend, and 12·368746 for the number of mean lunar months in the sidereal year, on which the heliacal risings of the fixed stars depend. These values are accurate for the present day; but, while it remains uncertain whether the earth's motion is subject to an acceleration, it is impossible to give the corresponding values in ancient times to more than four decimal places. We thus get 12·3683 for the number of lunar months in the tropical year, and 12·3687 for the number of lunar months in the sidereal year. A value almost identical with these was first proposed in 432 B.C. by the Greek astronomer Meton, who framed a cycle of seven intercalations in nineteen years, reckoning $\frac{2}{1}\frac{3}{6}\frac{5}{5}$ or 12·368421 mean months to the mean year. It is not certain whether the Metonic cycle was ever adopted at Athens (see CALENDAR [Greek]). The same cycle was brought into use in Babylonia in the 4th cent. B.C. at the latest, and has been generally adopted wherever intercalations have been regulated by cycles at all.

4. The calendar month.—Meton and his Greek successors aimed, however, not merely at establishing a cycle of intercalations, but at the establishment of a cycle which should regulate at once the length of the month and the number of months in the year, and which should thus render the calendar entirely independent of observation. For this purpose it was necessary to express the mean length of the month as a number of days represented by a fraction with 235 or a multiple of 235 as its denominator. Meton himself proposed $\frac{4}{2}\frac{9}{3}\frac{4}{5}\frac{0}{5}$ = 29d 12h 45m 57·45s. Callippus in 330 B.C. proposed $\frac{2}{9}\frac{7}{4}\frac{7}{0}\frac{8}{0}\frac{2}{0}$ = 29d 12h 44m 25·53s. Finally, about 143 B.C., Hipparchus proposed $\frac{1}{6}\frac{1}{7}\frac{1}{0}\frac{0}{0}\frac{3}{0}\frac{5}{0}$ = 29d 12h 44m 2·55s. The true length of the mean lunar month is 29d 12h 44m 2·81s for the present day, or 29d 12h 44m 3·3s for the time of Hipparchus, so that the cycles successively proposed mark a gradual approach to the true value. Elsewhere the length of the month was beginning to be obtained by calculation instead of by observation, but it was apparently among the Greeks only that these calculations were combined with those governing intercalation to form a cycle. The Elephantine papyri show that the Jews of that city were already, in the 5th cent. B.C., beginning their months not at the phasis of the moon, but at the sunset following the mean conjunction of the sun and moon, which they found by calculation; they adopted a value for the mean lunar month of not less than 29d 12h 43m 44·63s and not more than 29d 12h 44m 51·15s (*Monthly Notices of the Royal Astronomical Society*, lxix. 19). But, while they found the beginning of the month by calculation, they appear to have had irregular intercalations, governed perhaps by the state of the crops. In the 2nd cent. B.C. both Hipparchus and his Babylonian contemporaries adopted 29d 12h 44m 3·3s as the true length of the mean lunar month—a value as exact as any that modern astronomy can assign. The Babylonian astronomers even went the length of computing the time of the true conjunction of the sun and moon, having regard to the anomalistic motion of both luminaries, and then performed the still more complex problem of computing the time of phasis, which determined the beginning of the calendar month.

5. The Julian calendar.—In the 1st cent. B.C. there was a reaction throughout the Roman Empire against the lunar calendar. In 46 B.C., Julius Cæsar, with the aid of the Alexandrian astronomer Sosigenes, constructed the famous Julian calendar, in which the motion of the moon was entirely ignored, and the mean year was taken at the value current in Egypt, 365 days, 6 hours. Each month was given a fixed number of days, with the single exception of February, which received 28 days in ordinary years, and 29 in every fourth year. The example set by Rome was rapidly followed, and different cities and communities in the Roman Empire either adopted the Julian calendar, or

framed calendars of their own based on the same principle. Sometimes the old calendar and the new lived on together, but lunar dates are rare in documents subsequent to the Christian era. The lunar calendar survived among the Jews, who, when they substituted calendar rules for observation in the 4th cent. A.D., adopted the Metonic cycle of intercalations and the Babylonian value for the mean lunar month.

6. The agricultural year.—Where the lunar calendar held good for religious, political, and commercial purposes, it was necessary for agricultural purposes to fix the seasons in some other way. The position of a particular month in the solar year might vary by a month within the space of a few years, and, where intercalation was irregular, might vary by considerably more. It was necessary therefore to have recourse to those phenomena which occupy a fixed place in the solar year, and from an early date Greek farmers recognized the season by observing the solstices and equinoxes, and the annual risings and settings of the fixed stars. They also noted what would be less easy to determine directly—in what sign of the zodiac the sun was stationed. No calendar, properly so called, was constructed out of these materials, but the interval between these different phenomena was early noted, and was connected with the change in the seasons and the state of the weather. Several of these intervals are given by Hesiod. When Meton published his calendar, he inserted the dates of the equinoxes and solstices and the heliacal rising of Sirius. Later astronomers compiled *parapegmata*, giving the exact intervals between those astronomical phenomena which recur annually, with the weather that ought to accompany each; and it was thus possible to obtain by dead reckoning from any single observation an accurate knowledge of the season of the year. These astronomical phenomena were inserted in Cæsar's calendar, often against the wrong date, and long continued in use to designate the season of the year, though their dates were doubtless taken in practice from the published calendar, and not from actual observation (*JPh*, No. 57, pp. 87–99).

7. The lunar calendar in the East.—It is believed that the modern Indian lunar calendar, first expounded in the *Sūrya-Siddhānta* belonging to one of the early centuries of our era, is based on Babylonian astronomy, from which several of its lunar values appear to be derived. The months are reckoned in some places from the true conjunction, in some from the true opposition, of the sun and moon; both are elaborately computed with reference to the anomalistic motion of both sun and moon. An intercalation takes place when two conjunctions or two oppositions occur while the sun is in the same sign of the zodiac. Here we have for the first time scientific computation entirely supplanting cycles and observations for both the number of days in the month and the number of months in the year. It is interesting to observe that, in order to accommodate the calendar the better to the anomalistic motion of the sun, the anomalistic year, *i.e.* the mean interval between two successive solar perigees, is taken as the solar year, and its duration is fixed at $365^d\ 6^h\ 12{\cdot}6^m$, whereas the correct duration at the present day is $365^d\ 6^h\ 13{\cdot}9^m$, and the duration in ancient times, for which it is impossible to determine the fraction of a minute, must have been $365^d\ 6^h\ 14^m$. It is interesting to observe that the Babylonians of the 2nd cent. B.C. reckoned $365^d\ 6^h\ 13{\cdot}8^m$, so that Indian astronomy is in this instance a little inferior to Babylonian (Kugler, *Die bab. Mondrechnung*, 1900, p. 95; Ginzel, *Handbuch der mathemat. und techn. Chronol.* i. [1906] 310–402). The Chinese calendar resembles the Indian lunar calendar in its general principles, both as regards the rule governing intercalation and the reckoning of the calendar month from the true conjunction as obtained by a strict astronomical computation; but the constants used are not Babylonian, and appear to have been derived from native astronomy, until this was superseded by Western science in the 17th century.

8. The week.—The Babylonians appear to have observed a Sabbath on every seventh day of the lunar month, and it is probable that this usage was originally connected with the four quarters of the moon. Among the Jews the seven days' week was reckoned independently of the moon, and we already find traces in the 1st cent. B.C. of its connexion at Rome with the sun, moon, and five planets, which have given their names to the seven days. In the modern Jewish calendar the length of the month is so arranged with regard to the days of the week as to prevent certain of the great festivals from falling on the day next to a Sabbath.

9. The lunar month and the week in the Christian calendar.—The connexion of the Christian festival of Easter with the Jewish Passover, and of the Christian Sunday with the Jewish week, has given rise to movable feasts in the Christian calendar. These feasts fall on a fixed day of the week, which is generally at a fixed interval from Easter, which falls on a Sunday on or near the date of Passover. From a very early period the Christians reckoned the date of the Passover and the consequent date of Easter for themselves. For this purpose we find an inaccurate 84 years' cycle used at Rome. Gradually the cycle of 19 years supplanted all others, and, in the form in which it was accommodated to the Julian calendar, the effect on the assumed date of Passover was the same as if the Callippic cycle had been adopted. It therefore assigned on an average 22^s too much to the lunar month. The result was that by the 16th cent. the calculated new moons fell on an average four days later than the true new moons. In the form which eventually won its way to acceptance the rule was that Easter fell on the first Sunday after that 14th day of a lunar month which fell on or next after March 21, where March 21 was supposed to represent the date of the vernal equinox, and it was widely, but erroneously, supposed that this rule was established by the Council of Nicæa in A.D. 325.

10. The Gregorian calendar.—The Julian year had been based on the mean interval between two consecutive heliacal risings of Sirius in Lower Egypt. This was a species of sidereal year. Already in the 2nd cent. B.C. Hipparchus had discovered a difference between the sidereal year, which governs the sun's position in relation to the fixed stars, and the tropical year, which governs the time of the equinoxes and solstices; but this discovery received little attention till the time of Ptolemy in the 2nd cent. A.D. The result was that the dates of the equinoxes and solstices moved slowly backward in the calendar year, until the date of the vernal equinox came to be March 11 instead of March 21. In consequence a new calendar was issued in the year 1582 by Pope Gregory XIII., assisted by the mathematician Clavius. Ten days were omitted at once so as to restore the vernal equinox to the date which it had occupied at the time of the Council of Nicæa; and the mean length of the calendar year was fixed at $365^d\ 5^h\ 49{\cdot}2^m$. The true length of the mean tropical year is at the present time $365^d\ 5^h\ 48{\cdot}8^m$, and must in 1582 have been $365^d\ 5^h\ 49^m$, the fraction of a minute being uncertain. It would appear, therefore, that the Gregorian calendar

adequately represents the tropical year. At the same time, provision was made for a correction of the lunar dates, by means of which Easter is calculated. The new calendar assumed for the lunar month a mean duration of $29^d\ 12^h\ 44^m\ 2{\cdot}71^s$—a duration which will be correct about 400 years after the present date. The reformed calendar was immediately adopted in nearly all Catholic countries, but only slowly among Protestant States, and has not yet been accepted by the Greek Church. It has the merit of checking the slow movement of the seasons backwards, which characterizes the Julian calendar; but it is a cumbrous system for calculations spread over long periods, and astronomers generally prefer to use the Julian and not the Gregorian year as the unit of time.

11. **The Muhammadan lunar year.** — The Muhammadan religion has given currency to an Arabian lunar calendar, in which the calendar year is a purely artificial period of twelve lunar months which is not correlated with the solar year, and which may begin at any season of that year. The beginnings of the months have usually been determined empirically; but calendar rules have been devised for astronomical purposes, and the empirical dates are rapidly giving way, except for religious purposes.

LITERATURE.—Ideler, *Handbuch der mathemat. und techn. Chronol.*, Berlin, 1825, 1826; Lersch, *Einleit. in die Chronol.*², Freiburg i. Br. 1899; Ginzel, *Handbuch der mathemat. und techn. Chronol.*, i., Leipzig, 1906; Schram, *Kalendariograph. und chronolog. Tafeln*, Leipzig, 1908.

J. K. FOTHERINGHAM.

CALENDAR (African).—Data regarding the African calendar are scanty, and concerning many tribes are thus far entirely lacking; but in general it may be affirmed that the degree of development was only meagre. A typical African calendar seems to be presented by that of the Warumbi, a people centred between lat. 0°–1° N., long. 27°–28° E. According to Maes (*Anthropos*, iv. 627),

'ils comptent les mois par lunes, distinguent les saisons et divisent l'année d'après elles. L'année des Warumbi va d'une saison sèche à l'autre. Celle-ci commence en décembre et finit vers la fin de janvier. L'année comporte approximativement 13 lunes, mais les Warumbi n'en comptent point le nombre. Ils ne savent d'ailleurs point déterminer exactement le nombre de jours d'une année. Quelquefois ils comptent par lunes, vous diront qu'il y a quatre ou cinq lunes, que telle ou telle chose est arrivée, mais n'en tiennent point compte pour déterminer leur âge, dont ils n'ont que peu ou point de notion. Chez eux l'on est jeune ou vieux, mais on ne compte jamais le nombre d'années de la vie.'

Perhaps the acme of African calendrical development is shown by the Yoruba, who have a year (*odun*) which is divided into a dry season (*ewo-erun*), the season of the Harmattan wind (*ewo-oye*), and the rainy season (*ewo-ojo*), the latter subdivided into the first rains (*aro-ko*) and the last rains (*aro-kuro*). They have a system of moons and weeks. The week consists of 5 days:[1] *Ako-ojo* ('First Day'), *Ojo-awo* ('Day of the Secret' [sacred to Ifa]), *Ojo-Ogun* ('Day of Ogun' [the god of iron]), *Ojo-Shango* ('Day of Shango' [the god of thunder]), and *Ojo-Obatala* ('Day of Obatala'). The first of these days is unlucky, and during it all work is forbidden; while, in addition, all followers of a particular god must abstain from labour on the day sacred to that god; blacksmiths, for example, are not allowed to ply their craft on *Ojo-Ogun*. Six of these weeks are supposed to make a lunar month, about 12 hours being subtracted from the last week in the moon to make it synchronize with the lunar month. The Yoruba are unacquainted with the hour, but divide the day (*osan*) into 5 periods, and the night (*oru*) into 3 'cock-crowings.' The week of five days is also in use among the Akposa of W. Africa; these are named *Eɣla*, *Ewa*, *Imle*, *Ekpɛ*, and *Ewle* or *Uwolowo*-day, the last being sacred to that divinity. No work may be performed on the second day, when worship is paid to deities other than Uwolowo (Müller, *Anthropos*, ii. 201). The Ahanta, of the W. Gold Coast, on the other hand, divide the lunar month into two periods of 10 days and one of about 9½, while a week of 8 days is recorded in Old Calabar (Daniell, *L'Institut*, ii. 90).

The Tshi-speaking peoples of W. Africa divide their year, which consists of 13 lunar months (*infi*), into the 'little Hohbor' (*Ahohbor kakrabah*, May–August) and the 'great Hohbor' (*Ahohbor kassi*, September–April), although some of the northern members of this stock have 12 months of 30 or 32 days, named from the seasons, etc. The lunar months are divided into 4 periods of 7 days each: *Adjivo-da* ('Khwadjo's Day'), *Ibna-da* or *Bna-da* ('Kobina's Day'), *Wuku-da* ('Kwaku's Day'), *Yaw-da* ('Yow's [or Kwow's] Day'), *Iffi-da* ('Kwoffi's Day'), *Memin-da* ('Kwamin's Day'), and *Kwasi-da* ('Kwasi's Day'), these names apparently being those of distinguished chiefs apotheosized after death. Wednesday, Saturday, and Sunday are considered feminine and lucky; Tuesday is a day of rest for fishermen, Friday for agriculturists, etc. The Tshi weeks begin at different times of the day, and both the Tshi and the Gã add to each seven-day week, to make the period of 4 weeks agree with the lunar month. Besides this system, the Tshi also reckon by periods of 40 or 42 days, the end of each of these periods being the great Adae feast, which is followed, after 18 or 20 days, by the little Adae, these Adaes, like the weeks, beginning at different periods of the day.

Even where the system of lunar months has been developed, the older method may still persist, an admirable example of this being found among the Basuto of S.E. Africa.

'More or less they keep or purely reckon their time by the seasons of the year (their changes), by animals (their birth time), by plants (their annuality or growth), by the stars, such as the Pleiades (their position, time of rising and setting), but more especially by the moon itself. A full month consists of that space of time from the beginning of the evening when the new moon is to be seen in the west . . . to the last day of its appearance in the heavens; and, moreover, includes two more days when the moon cannot be seen at all in the heavens. . . . The first of these two days is called or said by them that the moon *e ile mefela*, lit. 'is gone into the darks'; and the second, *e tlakoa ke litsoene*, lit. 'is being greeted by the apes.'[1] . . . After these days the new moon will be plainly visible to everybody, and therefore on this account they begin on this day to count a new month. Little regard is paid as to counting the number of days in any month, since the bulky moon itself fills up the deficiency' (Sechefo, *Anthropos*, iv. 931 f.).

The twelve lunar months of the Basuto year (*selemo*, also meaning 'spring,' 'plough-time') begin in August, and bear the following names: *Phato*, *Loetse* ('Anointer,' because, in the quaint words of Sechefo, himself a native Basuto, 'the hardy month of Phato [August] has truly been syringed, anointed, and sweetened by the present Loetse [anointer] anointing the land as it were by the sweet oil of delicacy and smiling verdure'), *Mphalane* (apparently from *Liphalana*, 'glitters,' because 'the fields are sparkling and glittering as if it were oceans of water gently moved by the soft breezes, and thus dancing under the brilliant sun'; this was formerly the month for the rite of female circumcision), *Pulungoana* ('young gnu,' these animals being born at this time of the year), *Tsitoe* ('grasshopper,' being the time of the hatching of such insects), *Pherekhong* ('inter-joining of sticks' [for building the huts of the watchers who keep the birds from destroying the crops]), *Tlhakola* ('wiping off' [of the green but impregnated husks of

[1] Cf. the five-day *pasar* week of Java and Sumatra (below, p. 131[b]). With this may be compared the Bab. *hamuštu*, a period of 5 days (based on the sexagesimal system) used in commercial transactions (Ginzel, *Handbuch der mathemat. und techn. Chronologie*, Leipzig, 1906, i. 94, 119); for further details regarding the Bab. five-day week, see below, p. 76[a].

[1] Because the apes, seated on the mountain-peaks, can see the new moon before it becomes visible to men dwelling lower down.

the *mabele* crop]), *Tlhakubele* or *Hlakubele* ('the *mabele* in grain'), *'Mesa* ('fire-kindling' [by the bird-scarers in the chill early morning] or 'roasting' [of mealies, which are plentiful in this month]), *Motseanong* ('laughter at birds' [the *mabele* now being ripe and able to mock the attacks of the birds, thus relieving the bird-scarers of their tasks]), *Phupjoane* ('beginning of swelling' [of the *senyarela-balemi*, a sort of bulb]), and *Phupu* ('bulging out' [of plants]).

It need scarcely be said that in parts of Africa, Muhammadanism has influenced the calendar, as is clearly seen, for instance, in the divisions of the day among the inhabitants of Bornu (Koelle, *African Native Literature*, London, 1854, p. 284).

The recurrence of sacred days among the Yoruba and Tshi has already been noted. In like fashion, Tuesday and Sunday, and especially Friday, are unlucky in Senegal; among the Mandingan Bambarra of the Sudan lucky days were the first of the month, even days not containing 6, and odd days containing 5; in Akkra, on the Gold Coast, a distinction was even drawn between lucky days of a greater or less degree of good fortune; and in Ashanti only about 150 days were recognized as sufficiently lucky for the commencement of important undertakings. Besides these days, there were festivals at greater intervals, such as the feast celebrating the planting of the yam in Dahomey, Ashanti, Fernando Po, etc., and that held at the harvest of the same fruit on the Gold Coast.

LITERATURE.—Waitz, *Anthropol. der Naturvölker*, Leipzig, 1860–77, ii. 201 *f.*, 224; Ellis, *Tshi-speaking Peoples*, London, 1882, pp. 215–221, and *Yoruba-speaking Peoples*, London, 1894, pp. 142–151; Sechefo, 'The Twelve Lunar Months among the Basuto,' in *Anthropos*, iv. 931–941, v. 71–81. The special thanks of the writer are due to Father Wilhelm Schmidt, S.V.D., editor of *Anthropos*, for his courtesy in sending him advance sheets of the second part of Sechefo's study expressly for the completion of the present article.

LOUIS H. GRAY.

CALENDAR (American).—1. Calendar systems of the North American Indians.—The North American Indians may, broadly speaking, be classed among those peoples who stand midway between the hunter state and the agricultural condition of existence. Some of the tribes among them possess calendar systems rich in varied festivals and celebrations, all more or less of an agricultural character; whilst others scarcely appear to notice the passage of time and the seasons, and possess almost no distinguishing feasts or other social observances. But all, even those living upon a more or less fixed agricultural basis, are at one in the simplicity of their methods of computing time, varying only in the more or less elaborate manner in which they celebrate its principal seasonal stages. Day and night, the changes of the moon and the seasons, the growth of vegetation and annual plants, and the habits of animals and birds, form the data upon which their systems are based. By some of the tribes four daily divisions were recognized—sunrise, noon, sunset, and midnight; whilst the diurnal round was usually designated a 'night' or 'sleep.' The manner of reckoning the years depended upon the locality in which the tribe was situated. Thus, in the more northerly latitudes they were known as 'snows,' and in the south as 'summers.' The four seasons were very generally recognized, and were named according to the natural phenomena incidental to their recurrence in various latitudes.

The lunation is by far the most important of the time divisions known to the Northern Amerinds. Before the coming of the white man there was, it is supposed, but little attempt at the construction of anything like a lunar year, and, where this attempt was made, the number of lunations embraced by a 'year' was generally 12. Some of the tribes, however, reckoned 13 moons to a year; and in one calendar—that of the Kiowa, which possesses 12 moons—half a moon is intercalated in one of the unequal four seasons, and the other half in the following season, the year commencing with the second half of a moon. Among the Zuñi of New Mexico the year is known as a 'passage of time,' and the seasons as 'the steps of the year.' The new year is called 'mid-journey of the sun,' to designate the middle of the solar round between the summer solstices. With the Zuñi, half of the months are 'nameless,' and the other six months 'named'; that is, the first six months have definite names, and the last six of the year have ritualistic names (such as Yellow, Blue, Red, White, Variegated, and Black), derived from the colours of the prayer-sticks offered up at the height of each 'crescent,' or moon, to the gods of the north, west, south, east, zenith, and nadir, who are severally represented by these colours.

Compensation for the surplus days in the solar year appears to have occurred to the Sioux or Ojibwas. Captain Jonathan Carver, in his *Three Years' Travels through the Interior Parts of North America* (1796), says:

'Some nations among them reckon their years by moons, and make them consist of twelve synodical or lunar months, observing, when thirty moons have waned, to add a supernumerary one, which they term the lost moon; and then begin to count as before' (p. 161).

He proceeds to relate that the first appearance of each moon was hailed by the Indians with joy. They gave a name to each month as follows, the year beginning at the first new moon after the vernal equinox:

March, Worm Month; *April*, Month of Plants; *May*, Month of Flowers; *June*, Hot Moon; *July*, Buck Moon; *August*, Sturgeon Moon; *September*, Corn Moon; *October*, Travelling Moon; *November*, Beaver Moon; *December*, Hunting Moon; *January*, Cold Moon; *February*, Snow Moon.

They called the last days of each moon the 'naked days,' and its first appearance its 'coming to life again.' They had no division of weeks, but counted days by 'sleeps,' half days by pointing to the sun at noon, and quarters by the rising and setting of the sun, for all of which they possessed hieroglyphic signs. The Haidah intercalated what they called a 'between-month,' because it was between the two periods into which they divided the year; and it is possible that this was sometimes omitted in order to rectify the calendar. The Creeks counted 12½ moons to the year, adding a moon at the end of every second year, reckoned half in the preceding and half in the following year, much as did the Kiowa. Many tribes kept records of events by means of symbolic figures or hieroglyphs. One of the most remarkable of these is the Dakota 'Lone-dog winter count,' painted on a buffalo skin, and depicting the events embraced between the years 1800 and 1871. The calendar history of the Kiowa is a similar record of tribal affairs. The Sioux tribes of the East measure time by leather thongs knotted in various ways—a device which was adopted by the Governor of South Carolina in his dealings with them (Mooney). They divide the year into five seasons, but do not possess so minute and peculiar a division of it as the Bella Coola Indians of British Columbia, who resolve the year into two parts, separated by the winter and summer solstices, which they regard as periods of indefinite length, and between which five months are counted. Each solstice is reckoned, therefore, as approximately six weeks (Boas).

The tribes of California, though related ethnologically in a more or less intimate manner, differ considerably from one another in their calendar system. The Hupa keep no account of time, as they consider it superfluous to do so, and guess at

one's age by examining the teeth. The Maidu believe that Kodoyampeh, the Creator, established the seasons, which they divide into *Kum-men-ni*, the rain season; *Yo-ho-men-ni*, the leaf season; *I-hi-lak-ki*, the dry season; and *Mat-men-ni*, the falling-leaf season. The Pima of Southern Arizona have long been accustomed to record events by means of notched sticks.

'Four sticks,' says Russell, 'were "told" to me by the men in whose charge they were. To any other person they would have been absolutely meaningless' ('Pima Annals' in *American Anthropologist*, vol. v.).

The years are marked on these sticks by transverse notches; the events by smaller notches or rude symbols. The oldest of these annals date from the time of the meteoric shower of 13th Nov. 1833, but older sticks were remembered by aged members of the tribe.

The Algonquin Indians of Virginia reckoned years by 'winters,' or *cohonks*—a name taken by them from the note of the wild geese during that season. They divided the year into the budding or blossoming season (spring), highest sun season (summer), corn-gathering season (autumn), and *cohonk* (winter). The months they designated as the moon of stags, corn moon, first and second moon of *cohonk*, etc. They made no distinction between one hour and another; but they divided the day into three parts—the rise, power, and lowering of the sun. They kept a calendar by making knots in string, not unlike the *quipo* records of the Peruvians.

The modern Creeks commence the New Year immediately after the celebration of the *Busk*,[1] or ripening of the new corn, in August (see below). They divide the year into two seasons only, viz. winter and summer; and subdivide it by the successive moons, as follows:

Heyóthlùccoor (Big ripening moon), August; *Otauwoóskóchee* (Little chestnut moon), September; *Otauwoóskólùcco* (Big chestnut moon), October; *Heewóolée* (Falliug-leaf moon), November; *Thlúffólùcco* (Big winter moon), December; *Thlúffóchósee* (Little winter moon, or Big winter moon's young brother), January; *Hootáhlàhássee* (Windy moon), February; *Taúsaútchoosee* (Little spring moon), March; *Taúsaütchéelùcco* (Big spring moon), April; *Keéhássee* (Mulberry moon), May; *Kóchóhassee* (Blackberry moon), June; *Hóyeüchee* (Little ripening moon), July.

They count the number of days or years, either past or to come, by tens, and can rarely compute more nearly than within a moon the date upon which a given event took place.

The Comanches, says Schoolcraft (*Hist. of Indian Tribes*, ii. 129), possess

'no computation of time beyond the seasons, which they count by the rising height of the grass, falling of the leaves, and the cold and hot seasons. They seldom count by new moons. With them one sun is one day.'

The Dakotas, says the same authority (ii. 177), 'count time by seasons, and 28 days to the moon.' The names of the moons are:

January, Hard moon; *February*, Moon in which racoons run; *March*, Moon of sore eyes; *April*, Moon when the geese lay; *May*, Moon for planting; *June*, Moon for strawberries and hoeing corn; *July*, Midsummer; *August*, Moon in which corn is gathered; *September*, Wild rice moon; *October* and *November*, Running of the doe; *December*, Moon when the does shed their horns.

The Mandans and Minnetarees, Dakotan tribes, are generally aware that there are more than 12 lunations in a year, but have no formal names for the lunar periods. The Hidatsa, a people of the same nation, speak of the seasons of 'cold weather' or of 'snow,' of 'warm weather,' and of 'death' or 'decay'; but they do not regularly allot a certain number of moons to each of these seasons.

2. **Festivals connected with the calendar of the N. American Indians.**—To a tribe subsisting upon an agricultural basis the prime object of keeping a calendar is the proper recognition and timely remembrance of seasonal festivals. In latitudes where the seasons are by no means exact in their recurrence, the lack of a stated calendar would quite disorganize all these celebrations; and, even with its aid, some confusion prevails in certain tribes as to the exact dates upon which certain ceremonies should be held. Many of these functions are of a highly elaborate nature, and occupy many days in their observance, the most minute attention being paid to the proper performance of the various rites connected with them. They consist, for the most part, of a preliminary fast, followed by symbolic dances or magical ceremonies, and concluding with a gluttonous orgy. A wide similarity prevails among these ordinances in North America, and, broadly speaking, it may be laid down that visible differences may be accounted for by circumstances of environment or variations in seasonal changes.

Of the Indians of Virginia (Algonquins), who were the first to come under the notice of Europeans, it was observed that they held regularly recurring festivals to celebrate the ripening of fruits and grain, and more irregular feasts to mark the return of wild fowl and the hunting season in general. These were obviously the celebrations of a people subsisting on a basis midway between the hunting and the agricultural states. That they were being slowly impelled towards the latter phase, however, is evident from the fact that their most important annual festival marked the period of harvest, the celebration of which lasted several days. Dances were engaged in, and heroic songs recited; and the entire observance appears to have been identical, in its general aspects, with the Indian festivals of the present day. The Creeks, as noted above, commence their New Year at a similar period, after the celebration of the *Busk*. The Cherokees recognize the same feast, at which time they burn all rubbish, and cleanse their habitations. A fast is then held for three days, during which time purgatives are taken. All crimes except murder are pardoned, so that the community as a whole may commence the new period free of sin. On the fourth morning the high priest produces a new fire by friction, and the members of the tribe are supplied from it. Feasting and dancing are then indulged in for three days, after which the people return to their usual avocations. This festival of the *Busk*, however, appears to have had other significance besides that of a mere seasonal offering of first-fruits. All the dances, invocations, and rites were shaped and ruled by the application of the number four and its multiples in every imaginable relation. Besides being a seasonal celebration, it possessed the significance of a sacrifice to the four winds—the rain-bringers. Four logs were placed in the shape of a cross pointing to the four cardinal points, and then consumed by fire, thus symbolizing the four winds to which they were a burnt-offering. The four winds originally typified the four ancestors of the human race.

Adhering to our classification of tribes according to the chronological sequence by which they became known to Europeans, we find that the Mandans (Dakotas) celebrated each year, as their principal festival, the 'Buffalo Dance'—a feast which marked the return of the buffalo-hunting season. The actions of buffaloes were imitated by eight men wearing the skins of these animals on their backs, with horns, hoofs, and tails remaining. Their bodies were painted black, red, or white; and a lock of buffalo hair was tied round their ankles. In their right hand they held a rattle, and in the left a slender rod, 6 ft. long, while on the back a bunch of green willow boughs was worn. The ceremony took place at the season of the year when the willow leaves fully expand under the bank of the river. Pairing off,

[1] Derived from Creek *puskita* = 'fasting.

the dancers took up their positions on four different sides of a large canoe, to represent the four cardinal points of the compass. Two figures were painted black, to represent night; and two red, to represent day. Two men, dressed as grizzly bears, stood beside the canoe, continually threatening to devour any one who interfered with the ceremony; and these had to be appeased with food, which, in turn, was snatched away from them, and carried off to the prairie by two other men. These were chased by a swarm of urchins, who relieved the men of their spoil. During the ceremony the old men beat upon sacks, chanting supplications for buffaloes and other provender. On the fourth day a man entered in the guise of an evil spirit, who was driven from the vicinity with stones and curses.

Although, on the surface, this festival would appear to be wholly a seasonal celebration, the introduction of the four cardinal points, which are therein symbolized, renders it more complex in its aspect. Essentially a hunter, the red man has ever these points present to his mind, and indeed they are to him, as to Empedocles, 'the source of ever-flowing nature.' Catlin, who recounts the circumstances of the festival, did not detect its origin in the veneration of the cardinal points, but numerous cognate myths since collected prove it to have had this conception as its foundation. The Buffalo Dance was probably a purely seasonal feast, which became confounded with the older idea of worshipping the four points of the universe.

The festivals of the Thompson River Indians of British Columbia have been fully investigated by Teit. They appear to be almost wholly social in their nature, and to possess but little true seasonal significance. In the winter-house feasts of these people a messenger is sent ahead by the visitors to announce their coming, so that the function takes somewhat the shape of a 'surprise party.' He further lets down food through a hole in the hut. Another custom of this tribe is to let down a kettle bedecked with feathers, and a lighted slow match, into the hut of the person to be visited, and to swing it violently, to the accompaniment of a rhythmic song. Those who have inserted it keep withdrawing it, while those inside attempt to catch and detain it when captured. Bundles of clothing and food are thrown down to the inmates of the hut as presents, and later on they return the visit. The semi-public feasts of the Thompson River Indians are known as 'potlatches,' and the staple food at these entertainments is usually horse-flesh. When this tribe gathers at the spring-house (*nskaptsê'lx*) for the annual fishing, a great dance-feast takes place. The people assemble in full festival paint, and commence dancing at sunrise, the married and unmarried men and women forming four separate groups. One chief stands at the west, and another at the east. These help to keep time for the dancers, and lead the singing, at intervals praying and prophesying. The unmarried people choose their husbands and wives during the first dance of the morning, and this part of the ceremony would seem symbolic of the spring mating season. At sunset the people again dance four times, and then disperse to their homes. After sunset a ceremonial smoke is held by the older men, when four pipes are smoked to the four cardinal points, or their spiritual prototypes. About fifty or sixty years ago the chief of the ceremonies began to hold these dances once a week, on Saturdays, and kept the days by cutting notches in sticks.

The Kwakiutl Indians of British Columbia have a winter dance, connected with the refunding of the purchase-money for a wife. It is most elaborate, but consists chiefly in rigorous cleanliness, and dancing in character, and closes with a veritable orgy.

One of the most highly developed and elaborate festival-systems of the Amerinds is that of the Hopi or Moki of Arizona, which has been exhaustively studied by several prominent anthropologists. It is typical of the snake-dances of all the Pueblo Indians, and is almost theatric in its performances. The *Soyalunwu* is a winter-solstice ceremony, held in December, and lasting about 9 days. It is purely an initiatory ceremony, in which the young men of the tribe are put through tests akin to those generally supposed to form part of the Masonic system. On passing the tests, the candidate is admitted to one or other of the secret societies of the tribe. The *Powamu* ceremony (*powamu* = 'put in order') is celebrated under the direction of the chief priest of the Powamu fraternity. By this rite the fields and gardens are symbolically put in order, and protected against sand-storms, ants, and other destructive forces, and finally are consecrated for the coming planting season. From 8 to 12 men participate, belonging to the different totem clans—Badger, Crow, Rabbit, etc. The high priest is assisted by the chief of the Katcina clan, the head of a kindred society. The period of the *Powamu* ceremony is in February. The *Mishonguori* ceremony is held in August, in alternate years, and is performed by the Snake and Antelope fraternities. It is announced on the fourth day following the last day of the *Niman*, or farewell ceremony of the Katcina brotherhood's season. It is essentially a seasonal festivity, the principal object of which is to obtain a good rain-supply, and it lasts 24 days. It is divided into groups of four days each—two of four days each, before the *yungya*, or assembly day; then, two of four days each of the ceremony pure and simple; and, finally, four days following the public performance, which are exclusively devoted to merrymaking. The *Oráibi*, summer snake-ceremony, has been more fully analyzed than any of the others. It is preceded by a preliminary ceremony sixteen days before, and by a nine-day ceremony which commences eight days before the snake-dance. In the years when the snake-dance is not performed, a complicated 'flute ceremony' takes its place. There exist two factions who never take part in the same festivities, called by Voth the 'Conservatives' and 'Liberals,' who are hostile to one another. The exact time for the performance of the snake-dance is difficult to place, as much depends on the condition of the melon and other crops. If the drought is great, the crops suffer, and the ceremony is hastened, but the date is partly regulated by that of the last *Katcina* ceremony in July, the snake-dance usually taking place on the fourth day after the last dance of the *Katcina* ceremony. There is also a winter ceremony lasting nine days, which is celebrated in January. The same *kivas*, or dance-houses, are made use of as in the summer ceremony, and the same songs introduced. This is the *Katcina* festival, which usually takes place in years with even numbers, and lasts intermittently until the summer festival season. These snake-charming ceremonies have their origin in the universal reverence shown to the serpent tribe all over America—a reverence based on the idea that the snake underwent an annual rejuvenescence in the casting of its skin, or perhaps that the symbol of the serpent with its tail in its mouth represented the round, full sun of August, the season of the ceremony of the snake-dance. The latter hypothesis is the more probable, as in the *Katcina* winter ceremony snakes are never used.

The Pima tribe of the Southern branch of the Athapascan family mark their drinking festivals or '*Tiswin* drunks' on their notched-stick calendars by the letter 'T.' These take place at the harvest season of the *saguaro* cactus, which marks the beginning of the year. It also coincides with the maize and mesquite harvest, and the torrid heat

of summer. These festivals partake more of the nature of debaucheries than of ritualistic ceremonies, and are purely seasonal celebrations.

'Illness feasts' are common with the Apache Indians. These are held for the purpose of banishing illness, and consist in the patient who suffers being fed by the medicine-man with choice food and *tiswin* drink, to the accompaniment of chanting. Should an epidemic be prevalent, however, a regular festival with dancing takes place, for the purpose of exorcizing those powers of evil who are regarded as answerable for the misfortune. The Apaches are not, however, overburdened with reverential ideas, or prone to self-humiliation, and have few religious festivals. Their principal celebrations are the 'Scalp Dance,' held after a successful combat, a ceremony for the purification of weapons, and burial-feasts attendant upon the sepulture of famous warriors.

The Iroquois have a 'Feast of the Dead' which occurs once in twelve years. The tribe proceed to the burying-place, and, after 'reviving' the names of those who have been dead for twelve years, exhume their bodies and cast them into a pit, along with clothing and provender, much in the spirit in which pre-historic man supplied his dead with things material.

The festivals of the tribes of California have been fully examined by Stephen Powers, who has skilfully analyzed the seasonal ceremonies of the Maidu, Konkan, Karok, Yuki, and other confederacies. The Maidu have four great festivals in the year: the *Hok-tom-we-dah* (open-air festival), in the spring; *I-lak-kum-we-dah* (dry season festival), about 1st July; *Ush-ti-naoh* (burning of the dead), about 1st September; and *Yak-kai-we-dah* (winter festival), about the end of December—all seasonal. Other important festivals of this tribe are the 'Manganita Dance,' held to celebrate the ripening of the manganita berry, and the 'Great Spirit Dance' in propitiation of demons. The Konkan, in the *Tsi-pi ka-mi-ni*, or 'Weeping Dance,' have a ceremony akin to the Iroquois 'Feast of the Dead' and the Maidu 'Burning of the Dead.' It is held in the last days of August, begins in the evening, and lasts till daybreak. The celebrants bring food and clothing to the place of sepulture, all of which articles must be new. These they hang on a semicircle of boughs. In the centre burns a large fire, close to the graves, round which a solemn dance is executed. The goods are then burned, and their 'astral' counterparts are supposed to reach those deceased persons for whom they were intended. This occasion marks the New Year's Day of the tribe. The Karok have a 'Dance of Propitiation' on 1st September, for the purpose of propitiating the spirits of earth and forest, when a fire is kindled—the first of the rainy season. Their 'Salmon Dance' is held at the opening of the salmon-fishing season, to ensure a good catch. The Yurok have a similar festival. The Wailakki celebrate a 'Clover Dance,' which is held when the burr clover is fit to eat; the Yuki have a 'Green Corn Dance' at a similar season; and the Tatu and Pomu have an 'Acorn Dance.' The last mentioned race possesses a curious festival, or rather ceremonial observance, known as the 'Grand Devil Dance.' It is held under the auspices of the fraternity of the 'Woman-Tamers' once in 7 years, and is looked forward to with terror by the women of the tribe. *Yu-ku-ku-la* (the devil) is supposed to visit the tribe in the guise of certain of its members. With these Satanic emissaries the men of the tribe engage in sham combat in defence of the women. This quaint custom is said to have had its rise in the intractability of the women of the Pomu, whom the men hoped to render more amiable by this means. The Nishinam celebrate a 'First Grass Dance' after the rainy season, and a 'Second Grass Dance' in the spring. Another vernal festival of theirs is the *We-da*, held in the early spring to guard against snake-bites. The *Ta-tu-lo-wis*, or 'Rattlesnake Dance,' of the Yokuts is held by the medicine-men of the tribe for the purpose of giving immunity to the Indians, for a year, from the dreaded snake-bite.

3. **Fasts of the N. American Indians.**—The practice of fasting is observed far and wide among the Indians, and, although frequently practised in connexion with public ceremonials, is perhaps more generally carried out in private. The first fast of life is usually the *puberty-fast*, when the youth or girl is sent to a deserted locality to remain alone for a period ranging from one day to a week, during which time he or she is supposed to be granted visions by means of which their career in life, or sometimes the nature of their totemic connexion with the supernatural, is to be made clear. The fast is usually accompanied by signs of self-abasement, such as torn garments or complete denudation, and earth-strewn head.

The most complete account of a puberty-fast is that of Catherine Wabose, or Ogeewyahnockwut Oquay, an Indian propheteSS, whose experiences thereof were taken from her own lips by Mrs. Schoolcraft. When she was 12 or 13 years old, she left her mother's lodge, and built a small one for herself. After a fast of four days, she was visited by her mother, who gave her a little snow-water to drink. On the night of the sixth day, whilst still fasting, she was conscious of a supernatural voice, which invited her to walk along a shining path, which led forwards and upwards. There she first met *Kau-ge-gay-be-qua*, the 'Everlasting Standing Woman,' who told her her supernatural name. She next met *Monido-Wininees*, or the 'Little Man Spirit,' who told her that his name would be the name of her first son. She was next addressed by *O-Shau-wau-e-geeghick*, or the 'Bright Blue Sky,' who endowed her with the gift of life. She was then encircled by bright points of light, and by sharp painless instruments, but, mounting upon a fish-like animal, she swam through the air back to the lodge. On the sixth day her mother fed her with a little dried trout, and on that night she experienced a repetition of the vision. On the seventh day she was fed with a little pounded corn in snow-water. After the seventh day she beheld a large round object like a stone descend from the sky and enter the lodge. It conferred upon her the gift of prophecy, and by virtue of this she assumed the rank of a prophetess upon her return to the tribe.

Before embarking upon *a warlike expedition*, or prior to *a great hunt*, it is quite common for the warrior or hunter to fast, and medicine-men regarded the practice as one which conferred upon them special powers of illumination. *Initiation into secret or religious societies* is almost invariably preceded by more or less rigorous abstinence, and in some of the great festivals the chief participants were obliged to fast prior to the ceremony. The length of these varied with the tribe, but in general their duration was from one to four days, a day being counted as from midnight to sunset. Water as well as solid food is generally prohibited in an Indian fast. The native standpoint as regards fasting is succinctly put by a Cherokee medicine-man, who explains its necessity as 'a means to spiritualize the human nature, and quicken the spiritual vision by abstinence from earthly food.' It is not uncommon to regard it as a means by which the 'smell' of worldly things may be removed. Tribal fasts are often announced, to avert any disaster which the medicine-men believe threatens the community.

4. **South American calendars and seasonal festivals.**—(1) *Peru.*—The only species of chronology known in the Peru of the Incas was a lunar reckoning. The four cardinal points in the sun's course were ascertained by means of the *intihuatana*, a device consisting of a high flattened rock surmounted by a small cone, the shadow of which, falling on certain notches on the stone below, marked the date of the great sun-festivals. The Peruvians, however, had no true calendar. At Cuzco, the capital, the solstices were measured

by pillars called *pachacta unanchac*, or indicators of time, which were erected in four groups on eminences—two in the direction of sunrise, and two in that of sunset—to mark the extreme points of the sun's rising and setting. The solstices were known to have arrived when the sun rose and set between the middle pair in each group. The nearest approximation to the year known to the Incan astronomers was the primitive one of 360 days, divided into 12 moons of 30 days each. These moons were not calendar months in the correct sense, but merely a succession of lunations, commencing with the winter solstice; and no method appears to have existed by which the reckoning might be co-ordinated with the succession of years. The names of the twelve moons, so far as can be ascertained from various sources, were as follows:

Huchuy Pucuy Quilla (Small-growing moon), approximately January; *Hatun Pucuy Quilla* (Great-growing moon), approximately February; *Paucar Pucuy Quilla* (Flower-growing moon), approximately March; *Ayrihua Quilla* (Twin-ears moon), approximately April; *Aymuray Quilla* (Harvest moon), approximately May; *Aucay Cusqui Quilla* (Breaking-soil moon), approximately June; *Chahua Huarqui Quilla* (Irrigation moon), approximately July; *Tarpuy Quilla* (Sowing moon), approximately August; *Ccoya Raymi Quilla* (Moon of the Moon-feast), approximately September; *Uma Raymi Quilla* (Moon of the Feast of the province of Uma), approximately October; *Ayamarca Raymi Quilla* (Moon of the Feast of the province of Ayamarca), approximately November; *Ccapac Raymi Quilla* (Moon of the Great Feast of the Sun), approximately December.

That the natural course of the moon was the standard of time with the Peruvians is inferred chiefly from the fact that the principal religious festivals began on the new moon following a solstice or equinox. The ceremonies in connexion with the greatest festival, the *Ccapac Raymi*, were made to approximate to the lunar phases, the various stages commencing with the 9th day, full moon, and 21st day, or last quarter. But there is good reason to believe that the ruling authorities often determined upon which moon a certain festival was to take place, and were by no means rigid in their acceptance of ecclesiastical chronology.

With the Peruvians each month had its approximate festival, or rather a festival was apportioned to each lunation. But the solstices and equinoxes were the occasions of established ceremonies. The arrival of the winter solstice, which in Peru occurs in June, was celebrated by the *Intip Raymi*, or great feast of the sun. The principal Peruvian festival was the *Ccapac Raymi*, the national feast of the great god Pachacamac, which took place at the summer solstice, when the New Year was supposed to begin. Molina, Fernandez, and Garcilasso, however, date the New Year from the winter solstice. The vernal equinox, which in Peru occurs in September, and coincides with the beginning of the rainy season, was the occasion of the third great feast of the Inca year, the *Ccapac Situa*, or *Ccoya Raymi* (moon-feast).

The general character of these festivals appears to have been mild, and indeed almost child-like. They usually consisted in the sacrifice of llamas from the sacred herds, libations of *maguey* or maize-spirit, and the performance of symbolic dances. One of the most picturesque was that of the *Citoc Raymi*, or gradually increasing sun, held in June, when nine days were given up to festival. For three days previous to the event a rigorous fast was observed, and no fire might be kindled in any house. On the fourth day the Inca, accompanied by the people *en masse*, proceeded to the great square of Cuzco to hail the rising sun, the advent of which they awaited in silence. On its appearance they greeted it with a joyous tumult, and, forming in procession, marched to the golden Temple of the Sun, where llamas were sacrificed, and a new fire was kindled by means of a concave mirror. Grain, flowers, animals, and aromatic gums were the usual sacrificial offerings on such occasions. This festival was broadly typical of all the seasonal celebrations of the Peruvians.

The calendar of Incan Peru was purely agricultural in its basis, and marked in its great festivals the renewal or abandonment of the labours of the field. It owed little to astronomical observation, and was not more advanced than the calendars of races otherwise much inferior in civilization.

(2) *Chili.*—The Araucans, the aboriginal inhabitants of Chili, observed the solstices by the shadows of rocks, reckoning time independently by a succession of 12 lunations having seasonal names.

(3) *Brazil.*—The Bakairi Caribs of Brazil possess a calendar which is almost unique in its nomenclature, illustrating, as it does, the transition from a merely seasonal reckoning to one in which the period of harvest is indicated. It is as follows:

Khopolateri = 'hardest rain' (about January); *Khopopogeto*, 'less rain' (February); *Khopohoketatile*, 'rain ceases' (March); *Khuraitile*, 'it (the weather) becomes good' (April); *Sagheho*, 'wood-cutting' (May and June); (July nameless); *Ihuitabe*, 'end-of-the-day-time' (August); *Khopoewile*, 'the-rain-is-coming' (September and October); (Nov. nameless); *Anaziutule*, 'the-maize-ripens' (December).

The Uapes of Brazil have a calendar to mark the recurrence of the *Dabucuri* festival, or initiation of the young men of the tribe. This occurs six times in the year as follows:

The *assaby* on 1st Jan.; the *ucuqui* on 2nd Feb.; the *miritz* on 3rd March; the *pataud* on 4th May; the *umari* on 5th July; and the *uiga* on 6th November.

These revels are of the most riotous description. The neophytes, painted black and red, are wedded to women of the tribe, to the accompaniment of mournful chants and dances. The myth of the god Jurupari is symbolized (see art. BRAZIL), and the proceedings end in a saturnalia.

(4) *Paraguay.*—The Abipones of Paraguay had a feast on the 'Recovery of the Pleiades.' When they disappeared, they were said to be 'sick,' and much rejoicing was evinced at their reappearance and supposed recovery. The principal festivals of this tribe were occasional, and signalized victories, burials, birth of caciques, shaving of widowers and widows, the changing of names, and councils of war. Upon news of a victory, a public crier was dispatched from house to house, who saluted the women with a kiss, and the men with a spear to which a bell was attached. The spear was returned to him when he left the dwelling after inviting the inmates to the festival. This office was usually filled by a medicine-man of advanced age. The house of celebration was decorated with the scalps of the slain enemies, hung on an erection made of reeds. The victors spent the time from sunset until morning in chanting their victories, and in drinking a species of liquor resembling mead.

(5) *Patagonia.*—The Tehuelches of Patagonia signalize the birth of a child by slaughtering a mare or cow, and removing the stomach, in which the newly-born infant is laid. The tribe then feast on the remainder of the animal. They appear to have no seasonal festivals. See, further, the 'Mexican and Mayan' article.

LITERATURE.—W. Bartram, *Travels through North and South Carolina*, London, 1791; Champlain, *Voyages*, tr. Chas. P. Otis, 1878–82; E. J. Payne, *Hist. of the New World called America*, 1892–99; J. Heckwelder, *History, Manners, and Customs of the Indian Nations*, Paris, 1822; J. Gregg, *Commerce of the Prairies*, New York, 1844; R. Beverley, *Hist. of Virginia*, London, 1855; Squier, *Hist. and Mythical Traditions of the Algonquins* (in S. G. Drake's *Aboriginal Races of North America*, 1848); H. R. Schoolcraft, *Indian Tribes of the U.S.*, Washington, 1851–59; G. Catlin, *Letters on the N.A. Indians*, 2 vols., London, 1841; B. Hawkins, *Sketch of the Creek Country*, 1848; De Smet, *Oregon Missions*, New York, 1847; A. Gallatin, *Synopsis of the Indian Tribes*, New York, 1836; A. S. Gatschet, *Migration Legend of the Creek Indians*, Philadelphia, 1884; H. Hale, *Iroquois Book of Rites*, Philadelphia, 1883; J. G. Bourke, *Snake-dance of the Moquis*, London, 1884; C. H. Coe, *Red Patriots*, London, 1893; J. Mooney, *Siouan Tribes of the East*, London, 1894; J. C.

Cremony, *Life among the Apaches*, 1868; J. Carver, *Travels*[3], London, 1781; Russell, *Amer. Anthrop.* v. [1903] 76; Boas and Swanton, *JAFL*, 1888; Swanton, *Amer. Anthrop.* v. [1903] 331; G. Mallery, *10 RBEW* [1893]; Mooney, *17 RBEW* [1898]; Dorsey and Voth in *Field Columbian Museum's Publ.*, Anthrop. series, iii. [1900–03]; Fewkes, *Jour. Am. Ethnol. and Archæol.* iv. [1894], *19 RBEW* [1900]; Matthews in *Mem. Amer. Illust. Nat. Hist.* vi. [1902]; Hoffmann in *7 RBEW* and *14 RBEW* [1891, 1896]; Jenks in *19 RBEW* [1900]; *Jesuit Relations*, ed. Thwaites (73 vols.), Cleveland, 1896–1901; Mindeleff in *17 RBEW* [1898]; Nelson in *18 RBEW* [1899]; Martin Dobrizhoffer, *The Abipones*, London, 1822; S. Powers, *Tribes of California*, 1877; C. R. Markham, *Rites and Laws of the Yncas*, London, 1873; H. Prichard, *Through the Heart of Patagonia*, London, 1902.

LEWIS SPENCE.

CALENDAR (Armenian).—When they became a Christian nation, the Armenians felt the need of a regular calendar for their religions ceremonies, and hence there was developed among them the study of the science of time. So long as they were pagans, this people, like the Egyptians and Persians, had a year of exactly 365 days, while, according to our calendar, the year has 365¼ days. This is why we reckon 366 days every fourth year. In 1460 years there would be a difference of a year between these two computations, so that the Julian year 1460 corresponds to the year 1461 of the Armenian era.

To indicate the relation of events in time, the Armenian chronologists, in the course of ages, invented various eras. These we shall pass in succinct review, referring for fuller details to the special works dealing with them. There are the *great Armenian era*, in which the year is a vague quantity (this is the era usually employed), and the *lesser eras*, the year of which is a fixed quantity.

1. The great Armenian era.—(*a*) '*Vague' year.*—According to Dulaurier (*Recherches*, p. 6), it is probable that the 'vague' year, which is found very early among the Persians, came into Armenia with Zoroastrianism, which, according to Iranian traditions, took its rise in Atropatene; and this transmission was carried out under the successors of Tigranes I., when Armenia passed into the hands of the Achæmenians. The designation 'vague year' is derived from the fact that, in the Armenian year, the days change their positions; similarly, the festivals, in four years, change by a day.

(*b*) *Months.*—The year is divided into twelve months of thirty days, with five additional days (*aweleach*, pronounced *aveliats*) which are intercalated after the twelfth month. The names are given here according to the scheme of transliteration explained by the present writer in Bishop Sebêos' *Histoire d'Héraclius*, Paris, 1904, p. xv:

1. Nawasard.	7. Mehekan.
2. Hori.	8. Areg.
3. Sahmi.	9. Ahekan.
4. Trê.	10. Mareri.
5. Khaloch (pron. Qarots).	11. Margach (pron. Margats).
6. Arach (pron. Arats).	12. Hrotich (pron. Hrotits).
Aweleach.	

The meaning of the month-names is still very obscure, in spite of the explanations that have been suggested, *e.g.*, by Dulaurier and Hübschmann. First of all, it must be noted that these names are often in the genitive, because they are under the government of the phrase 'month of,' understood before them.

Nawasard means 'New Year' (Dulaurier, *op. cit.* p. 11; Hübschmann, *Armen. Gram.*, Leipzig, 1897, i. 202). It is a word of Iranian origin; for meaning, cf. Persian *Nauruz*.

Hori and *Sahmi* are of very uncertain derivation; it has been observed that these words meant 'two' and 'three' in Georgian; these would therefore be the second and third months of the year.

Trê.—Galust Ter Mkrttschian found in a manuscript the older form *Treay*, which explains the common form *Trê*. *Treay* is a genitive; it must, then, be connected with the name of the god *Tîr* or *Tîwr*, whom we find mentioned by Agathangelos. Thus the fourth month of the ancient Armenian year is the month of the god Tir.

Khaloch would be the month of harvest (Dulaurier, p. 11 f.); it may also be the Armenian form of a different word, of foreign origin, introduced into the Armenian calendar.

Arach also looks like a genitive plural. All etymologies proposed for it down to the present day are unsatisfactory.

Mehekan.—A good explanation of this word is given by Hübschmann (*op. cit.* p. 194). It means the month sacred to the festival of Mihr or Mithra.

Areg looks like an Armenian word, meaning 'sun'; but it also may be a foreign Armenianized word.

Ahekan, according to Hübschmann (p. 95), corresponds to the Pahlavi word *Ādaragān*, 'das Monatsfest am Tage Adar des Monats Adar.' The form *Aheki* is also found, recalling the Armenian word *ahek* or *aheak*, which means 'left.'

Mareri, according to its form, may be either a nominative or a genitive singular. The etymologies proposed as yet do not seem satisfactory.

Margach is, in form, a genitive plural. It is an Armenian form of a Persian name, *Markezan* or *Markazan* (cf. Hübschmann, p. 506).

Hrotich is an Armenianized Persian word (cf. Hübschmann, p. 184 f.).

(*c*) *Days.*—These are practically the same in the ancient and the modern calendar:

Sunday = Miaśabathi or Kiraki.
Monday = Erkoušabathi.
Tuesday = Erekhśabathi.
Wednesday = Chorekhśabathi.
Thursday = Hingśabathi.
Friday = Urbath.
Saturday = Śabath.

The ancient Armenians had no continuous era for counting indefinitely. They reckoned by the years of the kings, patriarchs, etc. But when they became Christians they had to fix the Easter feast; they therefore borrowed the computation of Easter from the Alexandrians, who were the best Christian mathematicians at that time. They had Andrew of Byzantium's Paschal canon of 200 years, which lasted down to the 6th century. Then they borrowed the quincentenary canon (532) of Æas of Alexandria.[1] It must be carefully borne in mind that, when we speak of the establishment of an era, we mean the establishment of a canon.

When was the Armenian era established? Historical data on the subject will be found discussed at length in Dulaurier's work (p. 52). This author has shown that the beginning of the Armenian era is 552—the year when the 1st of Nawasard fell on the 11th of July. Chronologists have often fixed their synchronisms by writing 551; but this is a mistake. In spite of the disagreement amongst historians, it appears to be proved that, in 552, Nerses, and not Moses, was catholicos (cf. Kalemkiar's app. ii. in his Armenian tr. [Vienna, 1897, p. 107 ff.] of Gelzer's 'Armenien' in *PRE*[3] ii. 63 ff.; and the anonymous list of catholicoi [ed. Mgr. Ormanian] in *Calendrier de l'hôpital arménien*, Constantinople, 1908, p. 172). It is clear to the present writer that Nerses did not establish the Armenian era; for we must not confuse the starting-point of an era with the date of its establishment. It was while Moses was catholicos that the Armenian era was established, entirely for a canonical, viz. a Paschal, purpose. The starting-point of this era was fixed at 552 because the 200 years' canon of Andrew of Byzantium was completed then, and for several years there had been great difficulty in fixing the Easter feast. But the era could not have been actually established in 552, for the quincentenary cycle was not yet known. The latter computation was made at Alexandria by Æas in 562; it was the cycle of 532 (19 × 28). The Armenians reckoned 562 the tenth year of their cycle, and 552 became the first year. They must have required some time to acquaint themselves with this system and to adopt it. The result was that, by the end of the 6th cent., they had established an era to fix the computation of Easter, this era being based on the quincentenary canon of Alexandria, and started with the year 552. The catholicos Nerses, therefore, had nothing to do with this question.

[1] See Dulaurier (p. 36) for a very accurate list of canons, and for full information on the establishment and adoption of the various canons.

There was still, however, a great difficulty to face, since the reckoning was by Armenian 'vague' years, whereas for a Paschal cycle a fixed year was a necessity. In the 7th cent., we are told, Anania of Shirak tried to remedy this defect, but his work has not yet been discovered. The catholicos Anastasius (661–667) had deputed Anania to study the fixed calendar, and for this purpose he convoked the bishops to a national council. Anastasius died, however, before the meeting, and the Armenian era remains 'vague' down to this day (Dulaurier, p. 183). Dulaurier (pp. 383–389) gives an excellent table, which may still be employed, showing when the 1st of Nawasard falls for each year of the Armenian 'vague' chronology.

2. Lesser Armenian eras.—It was the end of the 11th cent. before Armenia had a fixed calendar, and she owed it to John the Deacon. His work consisted in the substitution of the Julian for the old 'vague' system; he intercalated the bissextile day of the Roman calendar after the fifth additional day, in imitation of the Alexandrians, and counted five instead of six additional days every fourth year, besides making the fixed year begin on the 11th of August. The Feasts of the Saints were made stable, and Armenian Menology received a regular definite form. The correspondence between the Armenian and the Roman months became absolutely fixed. The 'little era' of John the Deacon had vogue especially in Upper Armenia, but it is never used in the chronicles, and obtained no acceptance with the generality of the nation (Dulaurier, pp. 111–115).

Whereas the 'vague' year is called the 'great era,' the lesser eras have fixed years. The beginning of the 'little era' of John the Deacon is 1084, *i.e.* just a quincentenary after the opening of the 'great' Armenian era. Here, again, care must be taken not to confuse the starting-point of this era with the date of its establishment. John the Deacon established his 'little era' ten years after its commencement. It began in 1084, because that was exactly the first year of the second quincentenary; then he added an intercalary day (*Awelikh*), and thus obtained complete correspondence with the Julian year. Every four years there came a leap-year. Now a fixed year was established; the feasts changed no longer. John the Deacon kept the names of the days and months as they were in the ancient system, and his era is met with quite frequently in documents of the Middle Ages.

One question still remains obscure: in 1084 the 1st of Nawasard fell on the 29th of February; John the Deacon took as the beginning of his year the 11th of August. This fact has not yet received a satisfactory explanation (cf. von Gutschmid, 'Das iranische Jahr,' in *Berichte über d. Verh. der sächs. Gesellsch. der Wissensch.*, 1862, *passim*). In any case, John the Deacon established a purely ecclesiastical era, and brought it into agreement with the Julian era of the Martyrology.

After John the Deacon we have a third era, employed by the Armenians of Persia and the Indies—the 'little era' of Azaria, beginning with the year 1616 (1084 + 532). Like John the Deacon, Azaria employed the Julian year, with its intercalation every four years. He made a fixed year, but he added a day to the month of Nirhan, and so kept *Awelikh* unaltered. The year of Azaria began with the vernal equinox, *i.e.* 21st March, Julian = 2nd April, Gregorian. The names of the months in the calendar of Azaria are as follows:

	Julian.	Gregorian.
1. Šams	21 March.	2 April.
2. Adam	20 April.	2 May.
3. Šbath	20 May.	1 June.
4. Naxay	19 June.	1 July.
5. Lamar	19 July.	31 July.
6. Nadar	18 August.	30 August.
7. Thiray	17 September.	29 September.
8. Damay	17 October.	29 October.
9. Hamiray	16 November.	28 November.
10. Aram	16 December.	28 December.
11. Ovdan	15 January.	27 January.
12. Nirhan	14 February.	26 February.
Awelikh	16 March.	28 March.

Dulaurier (p. 116) explains these names as follows:—*Šams*, 'the sun,' and *Lamar*, 'the moon,' are two Arabic words; *Thiray* is exactly the same as *Tir*, the 4th month in the Persian calendar; *Šbath* suggests the Hebrew שְׁבָט (Dulaurier confuses this word with שְׁקֵד, which was the 11th month, from the February new moon till the March new moon [Gesenius, *Heb. und aram. Handwörterb.*[13], Leipzig, 1899]); *Hamiray* is the Arab. *Amir* or *Emir*; *Adam* is the name of the first man; *Aram*, that of the seventh descendant of Haik, the founder of the Armenian nation. The names of these months are, indeed, more or less comprehensible; but Dulaurier's explanations cannot be accepted. It must be remembered that the calendar of Azaria was employed by the Armenians of Persia and the Indies; the explanation of these names, then, must be sought in the direction of Persian and Hindustani.

From 1320 onwards (=760 of the Armenian era), the difference between the two eras was 550 years instead of 551. Nevertheless, to find the popular Christian year corresponding to a year of the Armenian era, it is necessary, as a rule, to continue adding 551. The reason for this is probably the fact that the fixed year of John the Deacon gained the ascendancy, so that the fixed year was used far oftener than the 'vague' year even by writers who employed the months of the latter [this theory will be developed by Galust Ter Mkrttschian in the preface to his edition of Agathangelos].

Although the 'vague' year of the Egyptians, Persians, and Armenians is the same (for the ancient Persians, cf. Tabari, *Gesch. der Perser und Araber*, tr. Nöldeke, Leyden, 1879, p. 436), there is a difference of five days between the Armenians and the Persians. The first day of the ancient Persian year fell on the 1st Awelikh of the Armenians, and not on 1st Nawasard. The Egyptian and Armenian computations, on the other hand, correspond exactly. An important question now arises. If, as is generally admitted on the evidence of the names of the months, the Armenians borrowed from the Persians, why did they not keep the same starting-point for their year? In the present writer's opinion, the Armenian computation was borrowed indirectly from the Egyptians, through the Aramæans of the South of Armenia; and then later, under Persian influence, the forms of the month-names changed. It was the Persians who, in borrowing from Egypt after its conquest by the Achæmenians, changed the method of computation for the beginning of the year. Von Gutschmid (*passim*) has tried to explain the cause and manner of this change; his explanation is ingenious but not convincing. Probably it was due to religious reasons.

The charts of the Rubenians, who ruled in Cilicia or Lesser Armenia, are dated by the Dionysian era of the Incarnation and by the Indiction, and occasionally, at the same time, by the Armenian era (Dulaurier, p. 122).

Galust Ter Mkrttschian, a monk of the monastery of Etchmiadzin, discovered a new Armenian era, the work of a certain Stephanos. In this era the months have the ancient names, and each has 30 days. It is probably a fixed era, and was used in Cilicia; the year began on 1st March (Julian). We have no further data. (This information is gathered from manuscript notes. It has not yet been published.)

There are other dates employed by the Armenians. On the walls of the cathedral of Ani and in certain manuscripts we find mentioned *thiw horomoch*, (pron. *horomots*), *i.e.* the 'Roman' or 'Byzantine era.' But it is not the well-known Byzantine era. This expression is explained by Brosset (*Collection des historiens arméniens*, St. Petersburg, 1874–76,

ii. 360), who makes this era begin in 248–249 (Julian)—the beginning of the second millennium from the foundation of Rome (751 + 249 = 1000).

There is another era called *thuakan Xosrovayin, i.e.* 'era of Khosrov,' but it has not yet been satisfactorily explained.

Mention should be made, finally, of a somewhat rare formula of the manuscripts, 'the era of the reign of the Lord,' in Armenia. This formula is found in an account of the Gospel of the Thargmanichkh, preserved among the Antonian Fathers at Ortakeuy (Constantinople), and would correspond to an era of Gregory the Illuminator, or of the conversion of Armenia to Christianity—301 of the Julian era (see Chamchean, *Hist. of Armenia* [in Armenian], Venice, 1784–86, iii. 2, 13; Karekin, *Catal. des anc. traductions armén.*, Venice, 1889, p. 606; Dashian, *Catal. der armen. Handschriften in der Mechitharisten Bibliothek zu Wien*, Vienna, 1895, p. 4, col. 2 of the Armenian text; *Survey of Armen. Palæography*, Vienna, 1898, p. 190 [in Armenian]). Dulaurier (p. 289 f.) also mentions a manuscript in the library of the patriarchal monastery of Etchmiadzin, which alludes to an era of the conversion of Armenia to Christianity, beginning with the year 304 (Julian), the time of Gregory the Illuminator's arrival at the patriarchal see.

3. **The conversion of an Armenian into a Julian date.**—The various chronologists who have turned their attention to the correspondence of Armenian dates with dates of other calendars, have invented systems more or less ingenious and more or less practical (which will be found in the works cited at end of art.). The following is a new method of converting an Armenian date into a Julian. Multiply the Armenian year by 365, add 191 and the number of the day reckoned from the commencement of the Armenian year, and call the result a. Divide a by 1461, calling the quotient b and the remainder c. Multiply b by 4, and add one of the numbers 0, 1, 2, 3, respectively, according as c is equal to or greater than the numbers 0, 365, 730, 1095, respectively, and call the result d. Add 551 to d, and the result is the Julian year in which the given Armenian date falls. Take from c one of the numbers 0, 365, 730, 1095, according as c is equal to or less than the 1st, 2nd, 3rd, or 4th of these numbers, and the result will be the place in the Julian year, already found, of the given Armenian date. The order 0 in a year means the last day of the preceding year. If the Armenian era is divisible by 4, it is necessary, finally, to add 1 to the Julian date.

Let us take two examples:

(1) Thomas Arcruni (10th cent.), *Hist. of Armenia* (tr. Brosset), p. 174, says: 'Ashot finished his days and died in the country of Vantosp, on Thursday, the 6th of the month of *Horhi*, 323 by Armenian computation, and was conveyed to his brethren in the monastery of Surh-Khatsh, in the province of Agbbag':

$$323 \times 365 + 191 + 36 = 118122 = a$$

$$\frac{118122}{1461} = 80 = b \text{ and remainder} = 1242 = c$$

$$80 \times 4 = 320$$
$$320 + 3 = 323 = d$$
$$323 + 551 = 874$$
$$1242 - 1095 = 147 = 27\text{th May.}$$

The Dominical Letter of the year 874 is *C*. The 1st of May is a Saturday, the 27th is a Thursday. Therefore, Thursday, the 6th Horhi, 323 of the Armenian era = Thursday, 27th May, 874 of the Julian era.

(2) Stephen Orbelian (13th cent.), *Hist. of Siunia* (tr. Brosset), p. 134, says: 'In the year 344, Easter falling on the 4th of Nawasard, I, Ter Hovhannes, ordained Bishop of Siounie, successor of Ter Soghomon, began the building of this church':

$$344 \times 365 + 191 + 4 = 125755 = a$$

$$\frac{125755}{1461} = 86 = b \text{ and remainder} = 109 = c$$

$$86 \times 4 = 344$$
$$344 + 0 = 344 = d$$
$$344 + 551 = 895$$
$$109 - 0 = 109;\ 109 + 1 = 110 = 20\text{th April.}$$

The Dominical Letter is *E*. The 1st of April is a Tuesday, the 20th is a Sunday. In the year 895, Easter fell on 20th April. Therefore, Sunday, the 4th of Nawasard, 344 of the Armenian era = Sunday, 20th April, 895 of the Julian era. (This is unpublished matter, following a manuscript note of Reverend Father Seraphin Abdullah, who will soon publish a complete, authoritative discussion of the Armenian era.)

Since the 'vague' Armenian year began on Thursday, 11th July 552, for the figures of the days of the week we count Thursday 1, Friday 2, etc., and Wednesday 7 or 0. To find the *1st of the Armenian year* or the 1st of Nawasard, we must divide the year by 7; the remainder is the day of the week of 1st Nawasard.

4. **Peculiarities of the Armenian liturgical calendar.**—The Armenian Church has not only the same feasts as other Christian Churches, but several peculiar to herself. While the other Churches celebrate their feasts on dates fixed by the civil calendar, with the exception of Easter and the feasts dependent thereon (movable feasts), the Armenian Church has only six fixed feasts: (1) the Theophany; (2) the Purification; (3) the Annunciation, formerly celebrated in the octave of the Nativity, on the fifth day; (4) the Nativity; (5) the Presentation; (6) the Conception. The Nativity of the Virgin was introduced among the Armenians in the 13th cent.; the Presentation and Conception are of a still later date (18th cent.). The Theophany was originally always celebrated on a Sunday; it was only in later times that it was fixed for the 6th of January.

The Armenian Church distributes the various feasts according to the days of the week. All the Sundays are consecrated to the Resurrection. Every Friday is sacred to the Crucifixion; fasting or very sparing diet is the rule on that day, and hymns of penitence are sung at service. A Dominical Feast may be held on a Friday; a Saint's Feast cannot take place either on a Sunday or on a Friday. Wednesdays, like Fridays, are given up to fasting and works of penitence; Wednesday, being considered the day on which the Annunciation took place, became the Feast of the Incarnation. The same rules, therefore, bind Friday and Wednesday; and no Saint's Feast can take place on Sunday, Wednesday, or Friday.

The Feasts of the Saints then may be celebrated only on Monday, Tuesday, Thursday, or Saturday; and, even on these days secured to them, they have to give place to a Dominical Feast or a fast-day falling on the same date. The Feasts of Saints falling on a Monday, Tuesday, or Thursday may be changed into Dominical Feasts or into days of fasting; those falling on a Saturday cannot be changed except into a Dominical Feast. There are about 125 days in the year on which the Feasts of the Saints may be celebrated, and the Armenian Church has also thought fit to group the memorials of several saints on one day.

The Dominical Feasts comprise all those connected with the Incarnation, the feasts of the Virgin, of the Holy Cross, and of the Church. These feasts have their own special hymns. The Feasts of the Saints are more simple, only some of them having special hymns; for the others, hymns are borrowed from the services of the Apostles or prophets, etc. On fast-days the hymns, psalms, and spiritual songs have a penitential tone.

The Easter Feast has a variability of 35 days (from 22nd March to 25th April), and there is accordingly a period in the liturgical year whose variability is determined by that of Easter. This period is divided into two parts: the days before and the days after Easter. The Armenians count back ten weeks from Easter Sunday, and fix for the tenth Sunday before Easter the day of Aradjavor, the beginning of their Paschal period. The second part contains fourteen weeks, seven from Easter to Pentecost, and seven from Pentecost to the Transfiguration (= *Vardavar*, the Feast of

Roses). This Paschal period of 24 weeks may begin at any date between 11th January and 15th February, and end between 28th June and 1st August.

The following are the prescriptions of the Armenian Church for the celebration of the Assumption of the Virgin and the Exaltation of the Cross.

If 15th August and 14th September fall on a Sunday, these feasts are held on those days. If 15th August and 14th September do not fall on a Sunday, they are celebrated on the Sundays nearest the dates in question. The Feast of the Assumption may fall on any day from the 12th to the 18th of August, and is preceded by a week of fasting, beginning on the preceding Monday. The Feast of the Exaltation of the Cross may fall between the 11th and the 17th of September. The period of Advent begins on the nearest Sunday to 18th November, and lasts on to the Theophany (see Tondini de Quarenghi, *op. cit. infra, passim*).

LITERATURE.—Fréret, 'De l'année armén., ou Suite des observations sur l'année vague des Perses,' in *MAIBL* xix. [1753] pp. 85–114; E. Dulaurier, *Histoire, dogmes, traditions et liturgie de l'église armén. orientale*[2], Paris, 1857, and *Recherches sur la chronol. armén. technique et historique*, vol. i. 'Chronologie technique,' Paris, 1859; von Gutschmid, 'Über das iranische Jahr,' Leipzig, 1862, in *Berichte der sächsischen Gesellschaft der Wissenschaften*, xiv. 1–9; Dashian, *Catal. der armen. Handschriften in der Mechitharisten Bibliothek zu Wien*, Vienna, 1895, *s.v.* 'Kalender'; Kiwleserean, Vartabed Babgen Dz., *Joghovourdin Tonatsoytse*, Constantinople, 1901 (in Armenian); Lalayan, 'The District of Borchala. . . . The saints, fasts, and festivals not mentioned in the calendar. Pilgrimages. Popular magic. Superstitions. Festivals' in *Azgagrakan Handes*, Tiflis, 1903, x. 112–268 (in Armenian); F. C. Conybeare, *Rituale Armenorum*, Oxford, 1905; Tondini de Quarenghi, Barnabite, *Étude sur le calendr. liturg. de la nation armén., avec le calendr. armén.* de 1907, *d'après le 'Tonatzouytz' du catholicos Siméon d'Erivan* (1774), Rome, 1906 [from *Bessarione*, *Rivista di studi orientali*, xc.-xcii.]; L. H. Gray, 'On certain Persian and Armenian Month-Names as influenced by the Avesta calendar,' in *JAOS* xxviii. [1907] pt. 2, pp. 331–344; J. Marquart, 'Untersuchung zur Geschichte von Eran (ii.),' in *Philologus*, Supplementary vol. x., Leipzig, 1907, p. 198 f.; F. Macler, *Catal. des manuscrits armén. et géorg. de la Biblioth. nationale*, Paris, 1908, Nos. 250–256. The author is further indebted for oral information gained from Galust Ter Mkrttschian at Etchmiadzin, in September 1909; and from Seraphin Abdullah, Mechitharist at Venice, at Asnières (Seine), in November 1909. FRÉDÉRIC MACLER.

CALENDAR (Babylonian).—It is coming to be more and more clearly recognized that the Babylonian festivals and the rites connected with them are related in the most intimate way with the calendar, which, again, is as old as civilization itself. As the ancient Egyptians had already fixed upon a year of 360 days, dividing it into three seasons of four months each, and as the actual source of this computation was Babylonia, it is clear that the cycle of 360, representing the earliest attempt to make an adjustment between the lunar year of 354 days and the solar year of 365¼ days, goes back to a very remote antiquity. 'Twelve are the months of the year; six *sosses* (*i.e.* 6×60=360) are the days of the measure of the year's beginning'—so runs the well-known and frequently cited passage in *WAI* iii. 52, 37, which reproduces an Assyr. copy of the early Bab. work on astrology known as *Enu-ma Bel*. The Egyptians and the Babylonians, in fact, differed only in their methods of *intercalation*, which the aberration from the true solar year soon rendered necessary: the Egyptians inserted the five so-called *epagomenæ* at the end of every year, while the Babylonians intercalated a whole month every fifth or sixth year, as required; or, in districts where the lunar year of 354 days prevailed—as, *e.g.*, the city of Ur—every second or third year. In reality, therefore, the Egyptians had a year of 365 days, retaining the older tradition of 360 days only by marking off the intercalary five as *epagomenæ* dedicated to special deities. Even this increment was in time found to be inadequate, the deficiency amounting to one day in four years, or, otherwise, to a month in 120 years, and a quarter of a year in 360; and accordingly we find, as far back as the period of the Old Empire, a further correction in the so-called Sothis or Sirius year (1461 common years=1460 stellar years). We cannot say whether the Babylonians had recourse to any such astronomical method of adjustment, but it is possible that the 'year of the great red serpent' (mentioned but once, in a text dating from *c.* 2000 B.C., *Cun. Texts*, xxii. 48, line 5), with its train of over a dozen—originally perhaps nineteen—names of animals, may refer to an intercalary cycle recognized in the period of the kings of Nisin.

The earliest Bab. calendar known to us shows a remarkable combination of purely agricultural operations and religious festivals, the calendar of the husbandman being thus interwoven with that of the priest. This consists of the names of months occurring in the temple archives found at Telloh, and dating from the period anterior to Sargon (*i.e.* the time of the *patesis* Lugal-anda and Uru-ka-gi-na, *c.* 3000 B.C., or even earlier). H. de Genouillac (*Tablettes sumer. arch.* p. xx, note 3) has essayed to arrange the names as follows:

1. Month of the festival of the goddess *Ba'u* (subsequently Tishri, *i.e.* the beginning of autumn).
2. Month of the *Áb-ud-du* festival (Teheth).
3. ,, the *Amar-ai-si-zid-da* festival (Shebaṭ).
4. ,, the *Še-kin-kud-du* festival ('corn-reaping': Adar), with the variants *Gùr-dub-ba* and *Gùr-im-dù-a* (written *-gab-a*), likewise referring to the apportionment of the corn.
5. Month of *Še-illa* (lit. 'corn-lifting,' possibly 'winnowing': Nisan), with the variants '*Lu-ku-še-a-illa* of the god Nin-Girsu,' '*Lu-ku-še-a-illa* of the goddess Iš-khanna'[1], and *An-ta-sur-ra*.
6. Month of the festival *Še-ku* ('corn-eating') of the goddess Iš-khanna.
7. Month of the festival *Gud-du-bil-sar-a* of the goddess Iš-khanna (Iyyar).
8. Month of the festival of the god Bil-dár.
10. ,, the festival *Dim-kù* ('corn-eating') of Nin-Girsu.
11. ,, the festival of the corn-eating of Nin-Girsu.
12. ,, the festival *Dim-kù* of the goddess Iš-khanna.

To these, however, must be added a few names which have not been identified, viz.:

Month *Mal-lu-úr* (meaning unknown).
Month of the god *Lugal-uru-ki* ('king of the city'), or *Lugal-uru-bar-ra*.
Month *Ši-nam-um-ni-ba-duru-ba-a* (meaning unknown).

One of these three would, no doubt, supply the name of the missing ninth month.

Tablets of a date slightly later, *i.e.* the period of the earlier Sargon of Agade (Akkad), furnish us with the following series, side by side with which we place the closely related series found in tablets dating from the times of the kings of Ur:

	Sargon.	Ur.
1 or 7.	Month of *Gan-maš*.	2. Month of *Gan-maš*.
2 or 8.	,, *Gud-du-bil-sar-sar*.	3. ,, *Gud-du-bil-sar-sar*.
3 or 9.	Month of the god *Bil-dár*.	4. Month of the festival of the god *Bil-dár*.
4 or 10.	Month of *Šu-numun* ('sowing').	5. Month of *Šu-numun* (the later Tammūz).
5 or 11.	Month of *Še-dim-kù*.	6. Month of *Dim-kù*.
6 or 12.	,, the god *Tur-zi* (Tammūz).	7. ,, the festival of the god *Tur-zi*.
	Ur=intercalary month.	8. Month of the festival of the deified *Dungi*.
7 or 1.	Month of the festival of the goddess *Ba'u*.	9. Month of the festival of the goddess *Ba'u*.
8 or 2.	Month of *Mu-šù-du*.[2]	10. Month of *Mu-šù-du*.[3]
9 or 3.	,, *Mes-en-du-še-a-nd*.	....
10 or 4.	Month of the festival *Amar-a-si*.	11. ,, *Amar-a-si*.
11 or 5.	Month of *Še-še-kin-a*.	12. ,, *Še-kin-kud*[4] (the later Adar).
12 or 6.	,, the festival *Še-illa*.	1. Month of *Še-illa*.

The comparison of these lists is most instructive. While the meaning of the Sumerian names is in many cases obscure, the fact that in the Sargon list the intercalary month is placed after Tammūz (the later Elūl) makes it clear that in this calendar

[1] The goddess whose name is formed by the ideogram *ab* (or *eš*) and the inscribed symbol *kha*; in the period of Ḥammurabi it occurs in the phonetic form *Iš-kha-ra*, and is commonly, though wrongly, transcribed *Nina*, as the goddess was also the deity of the later town Ninua.

[2] Written *Mu-šù-gab*.

[3] Written *Mu-šù-ul*.

[4] Side by side with this we also find a month *Dir-še-kin-kud*, *i.e.* the later *We-Adar*, or 2nd Adar (intercalary).

the year began in autumn, and that, accordingly, the festival of the New Year was observed on the 1st of Tishrī, the month of 'the festival of Ba'u.' We see, moreover, that in course of time the month associated with the new festival of the deified king Dungi took the place of the intercalary month (the so-called second Elūl). A further modification, however, must have been introduced at the same time, as the new month of the 'Dungi-festival' lost its intercalary significance, while, coincidently, the New Year festival was transferred to the first day of *Še-illa*, as follows indirectly from the fact that a second *Še-kin-kud* now makes its appearance as an intercalary month, thus fixing, of course, the end of the year. This modification also explains why the month of *Mes-en-du-še-a-na* simply drops out, thus making *Amar-a-si* follow immediately upon *Mu-šu-dú*.

It is unfortunate that the inscriptions of Gudea, which we must refer to a period shortly before the rise of the dynasty of Ur, supply only two names of months, viz., the 'festival of Ba'u,' or 'New Year' (Statue G, iii. 5 f. = E, v. 1 f.), and 'temple-month,' following immediately thereafter; but with the help of the partially mutilated third series of the calendar K. 104 (*WAI* v. 43) we can so far restore the calendar of Gudea, thus:

1.	Festival of *Ba'u*	= Tishrī (Autumn).
2.	Temple-month	= Arakhsamna.
3.	(unknown)	= Kislev.
4.	,,	= Ṭebeth.
5.	*Sin-ga-zu*[1]	= Shebaṭ.
6.	*Me-e-ki-gal*	= Adar.
7.	(unknown)	= Nisan (Spring).
8.	*Gud-bil-sar-sar*	= Iyyar.
9.	Festival of the goddess *Nin-DÁR*[2]	= Sivan.
10.	*Shu-numun-na*	= Tammūz.
11.	Festival of [*Gu-de* ?]-*a*	= Āb.
12.	*Ki-sig* (?)-*Ba'u*	= Elūl.

The following list (in Radau, *Early Bab. Hist.* p. 299) also dates from the period of the dynasty of Ur:

1.	Month of *Še-kin-kud*	('corn-reaping': the later Adar).
2.	,, *Maš-azag-kù*	(cf. *Gan-maš*?).
3.	,, *Dun-da-kù*	('eating of the *Dunda* fruit').
4.	,, *Khu-si-bil-khu-kù*	('eating of the *Khu-si-bil* bird').
5.	,, *Ki-sig*(?)-*Nin-a-zu*	('mourning for Nin-a-zu').
6.	,, *Isin-Nin-a-zu*	('festival of the god Nin-a-zu').
(1) 7.	,, *A-ki-ti*	('new year').
(2) 8.	,, *Isin-Dungi*	('festival of Dungi').
(3) 9.	,, *Shù-III-shá*	('third month').
(4) 10.	,, *Isin-makh*	('sublime festival').
(5) 11.	,, *Isin-an-na*	('festival of ears' [?]).
(6) 12.	,, *Isin-Me-ki-gál*.	

This series clearly bears a close relationship to that which we have re-constructed for Gudea's time. It certainly begins the year with the month of *Še-kin-kud* (beginning of spring), but it still calls the seventh month 'new year,' and also retains *Me-ki-gál* as the last month of the autumn half-year, precisely as does the list of Gudea; and, as it embraces a festival of Dungi, it cannot have been redacted before the deification of that monarch (in the thirty-seventh year of his reign).

Although the various series of months given above are drawn from documents discovered in the ruins of Telloh, and must accordingly have been in use in the kingdom of Sirgulla or Girsu in particular, yet in these lists, dating from the period anterior to Sargon till that of the kings of Ur, a considerable degree of diversity presents itself. Lists current in other districts would of course show a still greater diversity. Thus in Nippur, for instance, as is shown by the documents of the University of Pennsylvania about to be published by P. Engelbert Huber, there was, in the period of the kings of Ur, a different set of names in use, viz., the Sumerian designations recognized throughout Babylonia from the days of Ḫammurabi till the late Bab. period (and also in Assyria); which designations, however, were generally read as Semitic, and accordingly had at a later date simply the value of so-called ideograms. This Sumerian group current in Nippur at that early date is as follows (we give in a second column the usual Semitic renderings which subsequently came into use, and which, as is well known, were adopted by the Jews during the Exile, and are retained to this day in the Jewish calendar):

Bár, Bár-bár-garra, Bár-zag-garra ('New Year's month')	Nīsan.
Gud-si, Gud-si-su(-ga) ('direction of the ox')	Iyyar.
Shig-ga, Shig-a-A-ga-se-ga ('month of bricks')	Sīvan.
Shu-numun-a ('month of sowing, seed-month')	Tammūz.
Bil-bil-gar, Bil-bi-gar ('month of fire-making')	Āb.
Kin, Kin-Ishtar ('work, or mission of Ishtar')	Elūl.
Dul, Dul-azagga ('sacred hill')	Tishrī.
Gish-apin-dù-a, Apin-dù-a ('plough-till-age')	Marchesvan.
Gan-gan, Gan-gan-ud-du ('coming forth of the clouds' [?])	Kislev.
Ab-pa-ud-du, Ab-ud-du ('coming forth of the flood')	Ṭebsth.
Ash-a ('curse of water') or simply *Ash* ('curse')	Shebaṭ.
Še-kin-kud ('grain-harvest')	Adar.
(*Dirig-še-kin-kud, Še-kin-kud II-kam-ma*.	Intercalary Adar.)[1]

The names of the Sumerian list recur commonly in contracts and letters dating from the Ḫammurabi dynasty, and are thenceforward found in the following fixed forms:

Bár-zag-gar, Gud-si-sá, Shig-a, Shu-numun-na, Bil-bil-gar, Kin-Ishtar, Dul-azag, Apin-dù-a (or *Gish-apin-dù-a*), *Gan-gan-ud-du* (subsequently *Gan-gan-na* always, but *Gan-gan-ud-du* as late as the Kassite period), *Ab-ud-du, Ash-a* (subsequently *Ash-a-an* was common), *She-kin-kud*;[2] in the Assyr. and later Bab. period, however, the names were generally written in an abbreviated form, thus: *Bár* (or *Bár-azag*), *Gud, Shig, Shú, Bil*, etc.

From the period of the Ḫammurabi dynasty onwards, however, we note the important fact that, besides the Sumerian names enumerated above, their *Semitic* renderings are occasionally met with, but not always the same designations as in later times.

Thus we have *Arakh Rabûti* (month of the 'great' gods Anu and En-lil) for *Bár-zag-gar* (subsequently Nīsan); *Arakh Ayari* for *Gud-si-sá* (= Iyyar); *Arakh She-wa-*[*num*], and probably also *Khumtu*, for *Shig-a* (= Sivan); *Arakh Tur-zi* (= month of Tammūz) for *Shu-numun-na* (= Tammūz, or Du'uz); *Arakh Elunu* and *Arakh Elulî* for *Kin-Ishtar* (subsequently *Ululu* = Elūl); *Arakh Sibûti* (month of the Seven Stars or Pleiades) for *Še-kin-kud* (later Adaru); as also *Tiru, Kinânu* ('brazier,' probably = Kislev), *Nabri, Sandûti* (with the variant *Shadûti*), *Mamîti* (= Ṭebeth [?]) and 'festival of Ramman' (= Shebaṭ)—designations not yet precisely identified.

The usual Semitic series of names (K. 8521) seems to have become permanently established in the days of the Kassite period, and in the Assyr. age. We give it here, together with the names of the corresponding month-deities (K. 2049 + 129 = *WAI* iv.[2] 33):

Nisannu	(Nīsan)	Anu and En-lil.
Airu	(Iyyar)	Ea as the 'lord of mankind.'
Sīmannu	(Sivan)	Sin (moon-god).
Du'uzu	(Tammūz)	The 'hero' Niu-ib (= Tammūz, or the Sun of Spring).
Abu	(Āb)	Nin-gish-zidda (fire-god).
Ululu	(Elūl)	Ishtar (the planet Venus).

[1] Incorrectly transcribed from *Še-kin-kud* or from *Še-illa*?

[2] As V. Rawl. 43 gives the form *Nin-DAR-na* (with the prolongation *-na*), the name of this god, who is mentioned in the inscriptions of Gudea as the consort of Iš-khanna, would probably be more accurately transcribed *Nin-gún-na*.

[1] Along with these, as the writer is privately informed by Pater E. Huber, occur names—singly, it is true—with which we are already acquainted from the lists given above, such as *A-ki-ti, Šu-esh-sha, Isin-makh, Isin-an-na, Isin-Me-ki-gál, Mash-azag-kù, Kul-da-kù* (cf. above *Dun-da-kù* or *Shil-da-kù*), *Isin-Nin-a-zu*, i.e. eight names, elsewhere specifically vouched for only in Radau's list, together with a few otherwise unknown designations, such as *Azag-shim, Sha-sir-a-she-de-a-sar, Mi-du-du* (or *Mi-ush-ush* [?]).

[2] We find, further, in this period a month called *Si-a-ga* (perhaps also *Isin-a-ga*), which should probably be identified with the *Shig-a-A-ga-se-ga* (hence a variant of *Shig* = *Sivan*) of the Nippur list; also a month called *Shu-gar-gi-na* (= Tiru [?]; cf. *Shu-gar-gi* = *turru*).

Tishrîtu	(Tishrī)	Shamash, the 'hero.'
Arakh-samna	(Marchesvan)	Marduk (the planet Juppiter).
Kisîlimu	(Kislev)	Nergal (the planet Saturn).
Ṭebîtu	(Ṭebeth)	Papsukal (messenger of Anu and Ishtar).
Shabaṭu	(Shebaṭ)	Ramman (storm-god).
Addaru	(Adar)	Seven-god.
Intercalary Adar		Assur, father of the gods.[1]

The etymology of these Semitic names is much more obscure than that of the corresponding Sumerian designations, which are for the most part quite intelligible. *Nîsan* seems originally to have meant 'intercalary month';[2] *Airu*, 'the month of blossom or sprouting'; *Addaru* is perhaps the 'dark' or 'gloomy' month, and *Kisîlimu* probably comes from the name of the river-goddess *Ka-silim*; a definite origin can be assigned only to *Du'uzu* (=Tammūz) and *Arakh-samna*, 'month of the numeral eight.'

It is obvious that the basis of this official Bab. calendar, more especially of its Sumerian terminology, is formed by the conception of a mythical world-year, which also dimly appears in the list of ten patriarchs given by Berosus and the Book of Genesis (before the Deluge). The first two months, viz. that of the 'Divine throne of destiny' (*Bár-zag-gar*) and the Ox-month (*Gud-si-sá*), belong to the highest triad of gods, and also to the first man, as being the creation of Ea (cf. in Berosus, *Aloros* [=Aruru], who creates man; *Adapados*, the Divine mediator or λόγος; *Amelon*=*amêlu*, 'man'). Then follow seven months assigned severally to the planets, as also to the zodiacal signs from Gemini to Sagittarius, viz. *Sîvan*, 'brick-month,' or the month of the heavenly twins Sin and Nergal, and of the building of the first city (cf. Gn 4[17]); *Tammūz* (Cancer); *Âb* (month of the 'descent of fire,' in the period of the Assyr. king Sargon; cf. the Sumer. designation 'fire-month' and the name of the sixth Heb. patriarch *'I-yarad*, 'fire came down,' abbreviated *Yared*); *Elūl* (Ishtar, the Virgo of the zodiac); *Tishrī* (*Dul-azag*, the 'sacred mount,' *i.e.* the altar of incense formed like a terraced tower in the sky near Libra); *Arakh-samna* (Scorpio; as regards 'plough-month,' cf. the Sumer. *lam*, 'plough,' and *Lamech*, the name of the corresponding Heb. patriarch), and *Kislev* (the 'clouds' of which foreshadow the Deluge). Moreover, just as in Genesis the Deluge takes place in connexion with Noah, so the next two months in this calendar, viz. *Ṭebeth* and *Shebaṭ* (Sumer. 'coming of the flood' and 'curse of rain,' respectively, and, in the zodiac, Capricornus and Aquarius, the watery region of the sky), carry an unmistakable reference to the Deluge, while the future burning of the world is symbolized by the last month, *Adar* (Pisces, but in Bab. astronomy, also 'lighthouse' or Pharos).[3] These cosmological ideas must, therefore, have been stamped upon the calendar system not later than the age of the kings of Ur.

Besides the Semitic names of the months already specified, there must have been other Semitic systems of nomenclature, of which, unfortunately, only a few isolated examples have come down to us. Thus we find, as far back as the days of the Ur dynasty, a month called *Dapitam* (sometimes *Dabi*), which was perhaps identical with the Sumer. *Bil-lal* (=*dabâti*; possibly we have here the origin of the later Ṭebeth). From Mesopotamia, again, in the period of Hammurabi, comes the name *Biriz-zarru* (from *Birid-sarru*, 'hostile coldness' [?]). The Assyrians, too, were acquainted with the usual Semitic appellations, but also used names like *Khi-bur*, *Kusallu* (=Sîvan), *Tamkhiru*, or *Tamṭiru* (?), the last of which would mean 'rain-month' (=Ṭebeth), *Pit-bâbi*, 'opening of the gate,' probably some religious ceremony (=Tammūz), *Mukhur-ilâni* (as early as Hadad-nirâri I.), and others found in the so-called Cappadocian tablets discussed by Goleschineff and Delitzsch. It is therefore interesting to note the list in V. Rawl. 43, which, though a mere fragment, originally contained three series of names, for the most part purely Semitic:

Sîvan:	*Apinum*	*Shir'i-eburi*	*Kusalli.*
Tammūz:	*Apal*	*Pite-bâbi*	*Allanâti.*
Elūl:	*Zargâtum* (?ורעות)	....	*[T]irrâti.*
Tishrī:	....	*Lalubê*	*Liki[tâ]ti.*
Shebaṭ:	*Ibtâzu*	*Silîliti*	....
Adar:	*Khul-dubba-uddu*[1]	*Isin-Me-ki-gál*	*Ḳardâti.*

The second group seems to have been current especially among the Semitic inhabitants of Elam; for, according to Scheil, *Mémoires*, x. 19, Semitic contract tablets from Elam of the early Babylonian age furnish the following important series:

Tishrī:	the month of		*Lalubum* (=Tishrī).
Arakh-samna:	,,	,,	*Eḳil-îli, epinu* ('the ploughing of the field of God').
Kislev:	,,	,,	*Sherkhum, epînu.*
Ṭebeth:	,,	,,	*Tamkhirum* (*cf.* the Assyrian month *Mukhurilâni*).
Shebaṭ:	,,	,,	*Zililitum.*[2]
Adar:	,,	,,	*Eḳil-îli-She-kin-kud* ('ear-harvest of the field of God'), and *Adarum.*
Nîsan:	,,	,,	*Sherkhum-She-kin-kud-a.*
Iyyar:	,,	,,	*Kharshubium* (cf. *kharshû*, 'land-cultivation' [?]).
Sivan:	,,	,,	*Lakhkhum* (?).
Tammûz:	,,	,,	*Datium* (?).
Âb:	,,	,,	*Abum.*
Elûl:	,,	,,	*Elûli.*

A dislocation to the extent of one month, introduced into Elam probably at a later period, is indicated by an isolated reference in II. Rawl. 49, No. 1, col. 1, 2: 'the month *Bár-azag-gar* (Nîsan) = the month *Gud* (Iyyar) in Elam.' Another Elamite name, *Ra-khal* ('sheep-month' [?]; cf. the name of the Elamite deity *Lakhurat-il* = *Rukhuratir*), is mentioned in Scheil, *op. cit.* ix. 32, as occurring in documents of the 6th and 7th cents. B.C., which elsewhere make use of the ordinary abbreviated Bab. ideograms. As every month but Tishrī has been traced in these, Scheil is probably correct in supposing that *Ra-khal* was an Elamite name for it. It is also possible that the twelve Elamite gods enumerated by Ashurbanipal immediately after the seven deities worshipped by the kings, *i.e.* the planetary deities, were originally gods of the months. The twelve are as follows: Ragiba (cf. the Arab. spring-month *Rajab*), Sunugursara ('the great king'), Karsa, Kirsamas, Shudânu, Aipak-sîna, Bilala, Paningirri (rather than Panintimri), Silagara, Nabsa, Nabirtu, and Kindakarbu. The list is a *mélange* of Semitic (Ragib, Shudânu, Bilala, Nabsa, Nabirtu) and native Elamite names.

We have thus seen that in Babylonia the nomenclature of the months varied according to period and locality, and that eventually that particular system which is first attested by documents from Nippur in the age of the kings of Ur superseded all the others. The two great divisions of the year began respectively in spring (previous to 3000 B.C., in the sign of Gemini; from

[1] The assigning of the intercalary month to the supreme deity of Assyria shows that the Assyr. calendar likewise is of Bab. origin.

[2] Cf. the Arab. *nasa'a*, 'to intercalate a month.' This derivation would suggest that at an earlier period the year began with Airu, the 'coronation-month' of the Assyrian kings; and, in point of fact, the inscriptions bear witness to a 'second Nîsan,' *i.e.* an intercalary Nîsan.

[3] To the constellation Pisces corresponds the 'great mountain' of Zec 4[7], which in Rev 8[8] is actually called ὄρος μέγα πυρὶ καιόμενον; quite close to it, in Aries, stands what in Zec 4[2] is called the *menôrah*, and in Rev 8[7] πῦρ. The 'mountain' which Bel climbs with shouts (*WAI* iv. 11, 41a) is depicted on the Bab. seal-cylinders in storey-form.

[1] This name is transmitted in Sumerian only; *Khul-dubba* is a frequently mentioned tool of worship.

[2] Inexact spelling of *Silîlitum*; in the Gilgamesh epic (Song 6), *Silîli* is the name applied to the mother of the horse that Ishtar loved, *i.e.* probably the astronomical Pegasus (*Silîlîtu* is therefore the *plur. majest.* for Pegasus).

3000 to 1000 B.C. in Taurus; from 1000 B.C. in Aries), and in autumn (Sagittarius, Scorpio, and Libra, for corresponding periods). At first the year itself might begin either in spring or in autumn, but in no long time there arose the recognition of a definite date for its commencement, viz. either in Nīsan or in Tishrī, with a second Adar or second Elūl as intercalary, according to period and locality. It may well be the case that the practice of beginning the year with autumn was a Chaldæan one, thus covering Ur, Girsu, and the region east of the Tigris, and that the beginning with spring belonged to Babylonia proper—Nippur, Babylon, etc. While it was the custom under Ḫammurabi to intercalate a second Elūl, we find that under his successors the intercalation of a second Adar already prevailed; in the reign of Abeshua, in fact, we have one instance of an intercalary Nīsan, with which should be compared the hemerology in K. 2514+4101, as also the suggestion already made, that at one time the year began with Iyyar. Perhaps this was actually the early Assyr. practice.

Similarly it is probable that the observance of a lunar year of 354 days, with months of 30 and 29 days alternately, and with an intercalary month every 2nd or 3rd year, was of Chaldæan origin, whereas the year of 360 days may be hypothetically assigned to Babylonia (see above). As a matter of fact, the temple archives of Telloh, dating from the period of the kings of Ur, suggest in all probability an intercalary cycle of 19 years, the additional month being introduced in the third year four times successively, and in the second year three times successively. Thus, *e.g.*, the intercalary year synchronized with the 28th and 31st years of king Dungi, and likewise with his 42nd, 44th, and probably his 46th year; as also with the 3rd, 5th (7th), and 9th years of Gimil-Sin; so that during the intermediate reign of Bûr-Sin the intercalation would fall in his 3rd, 6th, and 9th years (cf. L. Messerschmidt's list in A. Jeremias, *Das Alter der bab. Astr.*[2], Leipzig, 1909, p. 88 f.).

In regard to the *week*, we find a similar contrast between the practice in Chaldæa, *i.e.* among the nomadic and West Semitic tribes, and that of the Bab. state religion, in which the worship, not of the moon, but of Shamash and Mardnk, was the dominant factor. As has been ingeniously argued by Sayce — with the independent support of Winckler and Jensen—from early Assyr. contract tablets found in Cappadocia, the most ancient division of the month was into weeks of five days, the year accordingly having 72 weeks (which presupposes, moreover, a year of 360 instead of 354 days), as was also the case in ancient Egypt, where a week of ten days—originally, no doubt, a double-week of 2×5 days—was recognized (for other instances of the five-day week in Africa, Java, and Sumatra, see p. 64[a]). In the hemerologies of the library of Ashurbanipal, however, in which apparently every month consisted of 30 days,[1] we find entries from a Chaldæan calendar with months of 30 and 29 days, according to which new moon fell on the 1st day of the 1st month and of alternate months thereafter, while a penitential day of some kind was observed on the 7th, 14th, 21st, and 28th days of the 1st month, and on the [5th, 12th, and] 19th of the 2nd month, and so on throughout the year; here, therefore, we have quite plainly a week of 7 days.[1] A like result follows from the division given in K. 170 (*Cun. Texts*, xxv. 50), viz., 1st day, new moon; 7th day, moon as a kidney, *i.e.* half-moon; 15th day, full moon (elsewhere *shabadtu*; Old Egyp. *smd-t*), and from the Creation epic, 5, 15 ff.[2]

According to this hemerology, the festivals observed every month—apart from the specifically Chaldæan festivals already named—were as follows:—

The *Nubattu*, or 'nuptial couch' of the god Marduk of Babylon and his consort *Ṣarpanit* (cf. Ašurb. ix. 11), on the 3rd, 7th, and 16th days, and on the following days (the 4th, 8th, and 17th) the *Ab-ab* or *Eššešu* festival of the god Nebo.

On the 1st, 2nd, 13th, 15th and 16th, 18th and 19th, 20th and 21st and the 22nd days, sacrifices to the gods Shamash, Belit-matati ('mistress of lands'), Sin and Makh (*i.e.* Rûbatu, 'the exalted'), and to Sin and Makh only, on the 29th.

The *Se-gar* festival of En-lil and Nin-lil (cf. Ašurb. i. 12) on the 12th, and the 'bright day,' the *Se-gar* festival of Sin and Shamash on the 20th.

The festival of Shamash and Ramman (summer sun and winter sun) on the 23rd.

The festival of En-egal ('lord of the palace,' *i.e.* probably, of the under world) and of Nin-egal ('mistress of the palace') on the 24th.

The festival of the goddess Gur as the consort of Nergal on the 27th; this was associated with the imminent disappearance of the waning (or so-called Nergal) moon, as was also the *Bubbulu* ('to be borne or washed away'; cf. Heb. *mabbûl*, 'the Flood') of Nergal on the 28th. Sacrifices to Ea, the god of the watery region of the heavens, and his consort Makh, were also made on the 26th and 28th.

That the majority of these festivals were of astral origin appears from their manifest connexion with the course of the moon; from the fact that most of the sacrifices had to be offered in the evening or by night; and, finally, from the explicit mention of the worship of the 'star of the waggon' on the 10th and 25th of the month.

The calendar in *WAI* v. 48 refers not to festivals, but to the performance or omission of certain actions; we are told, *e.g.*, that the 10th of Iyyar and the 27th of Tammūz are 'favourable for judgment' (or, 'for administering justice'), the 20th of Iyyar is a time for 'killing a goose,' the 21st for 'quarrels,' the 25th 'not to take a wife,' etc.

There were also festivals, however, which were observed not every month, but in some particular month, thus resembling the great festivals of modern times. Chief among these was the New Year festival (*Zag-mug* or *Akitu*), which was celebrated with great pomp from the 1st to the 10th of Nīsan: on the 8th Marduk came forth in solemn procession from his temple of E-sag-illa, to the house of prayer or sacrifice situated outside the city in order to celebrate his marriage with Ṣarpanit, returning thereafter from the suburb of Shu-anna to Babylon on the 11th of Nīsan (cf. Nebuchadn. ii. 57). In Sippar the corresponding festival of Shamash was held on the 7th of Nīsan, and was repeated at the beginning of the second half-year, on the 7th of Tishrī.

On the 4th of Iyyar was celebrated the marriage-feast of Nebo and his consort Tashmit (K. 501= Harper, *Letters*, No. 113, and cf. above the *Ab-ab* festival), and on the 10th of Iyyar there was in Sippar a festival of Shamash, with which the coronation festival in Assyria—the king being regarded as the incarnation of the sun-god (cf. 20, number of Shamash and ideogram for king)—was perhaps connected.

[1] The complete series consisted of fifteen tablets. Of these, Nos. 2 (II Nīsan), 4 (Sivan), 8 (II Elūl), 10 (Marchesvan), 12 (Ṭeheth), 13 (Shebaṭ) and 15 (II Adar) have survived, in full or in part; but only tablets 8 and 10 have been published (*WAI* iv.[2] 32, 33). From the variants furnished by Pinches we may infer that all the tablets contained approximately the same festivals. The name of the series was *Inbu* (the moon-god as 'fruit' that grows of itself [cf. *WAI* iv. 9. 22]) *bêl-arḫim* (*i.e.* as 'lord of the month').

[1] This required to be adjusted, however, by reckoning a week of ten days (from the 20th to the 29th) at the end of every second month.

[2] On the other hand, the week of five days is presupposed in *WAI* iii. 55, No. 3, lines 17–26; 1st–5th day, new moon; 6th–10th, kidney (half-moon); 11th–15th, full moon.

On the 17th of Sīvan—the month of the moon-god—the *Akîtu* festival was held in Ḫarran, the ancient lunar city of Mesopotamia; in Arbela, however, it fell on the 17th of Elūl, the month of the goddess Ishtar, who was greatly venerated in that city. A processional festival of the 'mistress of Babylon' was held there on the 25th of Sīvan (Ašurb. viii. 96–100).

On the 3rd of Tammūz the gods of Erech returned from a procession at Eridu—a ceremonial undoubtedly connected in some way with the 'death-mournings' (*ki-bad*) held in that month on account of the summer languishing of Tammūz, the god of spring and of vegetation (cf. Ezk 8^{14}). In Ab, the month of the Sirius festival and of the zodiacal constellation Leo—the sacred beast of Ishtar—a great feast was celebrated in honour of that goddess (Ašurb. cylinder B. 5, 16), but it was presumably repeated in the following month, Elūl ('the corn-ears of Ishtar'), as we know to have been actually the case in Arbela (see above).

Corresponding to the festival of Shamash in Sippar on the 10th of Īyyar, a sacrificial feast in honour of the sun-god was also observed in that city in the month of Marchesvan. This, however, took place on the 15th of the month—the precise date, therefore, on which Jeroboam instituted the festival of the two golden calves in Bethel (1 K 12^{32}), the calves being emblematic, at least in the first instance, of the waxing and waning moon, though the festival may have been intended simply to represent that of *Sukkôth* ('Booths'), with a postponement from the 15th of Tishrī to the same day of the following month.

For the month of Kislev a special ephemeris in a late-Babylonian transcript has been preserved (Reisner, *Hymnen*, 1896, No. vii. p. 144). With certain days of this ninth or winter month, viz., the 4th and 7th, 8th, 10th, 12th and 13th, 15th and 16th, 22nd and 25th, and finally the 29th, this document associates certain temple-festivals in various cities; *e.g.* with the 4th, that of Marduk in E-Temen-an-ki (in Babylon), the Ishtar festival in Dûr-Kurigalzu, and that of the 'mistress of Ninâ' (in the district east of the Tigris); with the 15th that of Ash-kur in Sadirim. As the 29th is associated with the festival 'of the god Nergal' without indication of locality,—and therefore probably common to all Babylonia,—this function presumably represents the day of Nergal's death at the winter solstice (21st Dec.) or 'the mourning for the death of En-me-sharra.'

In the month of Shebaṭ, as we learn from Asurb. ii. 134, the city of Kalaḫ observed the festival of Ninib, the chief deity of Nineveh, and there was a similar celebration in Elūl, the month of Ishtar. According to the list of month-gods in K. 2049 + 129 (*WAI* iv.^{2} 33 a, at the foot), Shebaṭ was dedicated to Papsukal, the messenger (*sukallu*) of Anu and Ishtar—in reality a representation of Tammūz as a youth (cf. Bab. *bâbu* = 'child'), and thus a deity allied in character to Ninib.

Finally, on the 15th of Adar a solemn sacrifice was offered to Shamash in the city of Sippar, as also on the 3rd of Elūl, the corresponding month of the other half-year. Whether the Jewish feast of Purim, which was likewise observed on the 15th of Adar, was in any way connected with this Shamash festival still remains a matter for investigation. The celebration of the Jewish festival lasted from the 13th to the 15th of Adar, while on the 13th of Īyyar the Assyr. eponyms entered upon office by pronouncing the words *pûru Asur Hadad agruru*, 'as I cast the lot of Asur and Hadad' (cf. the conjunction of Shamash and Hadad everywhere else; and with *garâru* cf. the Heb. *gôrāl*, 'lot,' probably an altered form of *gôrār*). In Est 3^7 the act of casting lots (פּוּר = גּוֹרָל) is manifestly associated with the accession and deposition (Nīsan to Adar) of Haman, the Persian grand vizier, *i.e.* the chief eponym: it would therefore seem that the name of the feast takes its origin from this event.

Had we a single complete calendar of the annual festivals observed in any of the more important centres of worship in Babylonia or Chaldæa, as, *e.g.*, Nippur or Babylon, or again, Ur or Eridu, we could, of course, give a more exact description of the various festivals. Even as it is, however, the astral origin of most of the functions is quite unmistakable. We have here, accordingly, a fresh corroboration of the fact that amongst the people of the ancient East there was no such thing as an agricultural festival without a religious basis. The two interests were combined from the first, even amongst nomads, but most completely, of course, amongst tillers of the soil.

In conclusion, something remains to be said with regard to the probable *origin* of the Babylonian—or more precisely, perhaps, the Chaldæan[1]—calendar. This problem is closely connected with that regarding the origin of the zodiac with its twelve divisions. The crux of the problem lies in the further question whether the Chaldæans had observed the phenomenon of precession, *i.e.* the advance of the equinoctial point by one zodiacal sign every 2160 (one-twelfth of 25920) years—a question undoubtedly to be answered in the affirmative. The list of monthly stars, with their relative degrees, given by Pinches in *JRAS*, 1900, pp. 573–5, shows clearly that the Babylonians, on the ground of early tradition, fixed the beginning of the zodiacal series at the eastern end of Gemini (cf. Hommel, *Aufsätze u. Abhandl.*, 1901, p. 459), and that accordingly their calendar must have originated *c.* 5000 B.C. This is corroborated by the delineations carved upon boundary stones dating from the Kassite period, these being based upon an equatorial zodiac beginning with the twin dragons. The figure corresponding to the latter—two heads of panthers or lions upon one neck—also plays an important part on the seal-cylinders, and sometimes occurs in conjunction with the severed head of Adapa, the god of creation, of whose blood mankind was formed on the morning of creation (or at the beginning of the world). The actual beginning of the world, however, which is anterior to the creation of man, was dated as far back as the period of Cancer, *i.e.* about 7000 B.C.; and this ancient astrological tradition is also implied by the Egyptian zodiac found in Denderah (dating from the Roman imperial period, but of Chaldæan origin), which likewise begins with Cancer. For in Cancer were situated the two contiguous dragons, one—that with the head of a lion—representing Tiâmat, the other—with the vulture's head—Kingu, her consort. The dragon with the lion's head, as a symbol of the beginning of the world, is found upon ancient seal-cylinders almost as frequently as the twin-dragon with two heads upon one neck just alluded to.

The Taurus era (*c.* 3000–1000 B.C.), immediately succeeding that of Gemini, is indicated by a sketch frequently reproduced on seal-cylinders, that, namely, in which the hero Gilgameš waters the wild-ox at the streams flowing from the vase bearing the young shoot—the treelet of Tammūz; while the twin-heroes Gilgameš and En-ki-kak (Eabani?), who are quite as frequently depicted together, point rather to the previous era. The shoot of Gilgameš, *ildaḳḳu* (earlier *išdaḳḳu*,

[1] As Chaldæa, *i.e.* the district to the west of the Euphrates, and perhaps embracing Eastern Arabia, was the native soil of astrology, and thus, too, of the earliest knowledge of the stars, it is altogether likely that the 'Babylonian' calendar has its origin in the same region, and not in Babylonia proper, which lies between the Euphrates and the Tigris.

Sumer. *giš-a-am*, i.e. 'tree of the water of the wild-ox'), the *νάρθηξ* of Prometheus, is not referred to in the surviving fragments of the epic, but it is mentioned in the ancient Sumerian hymn of Nergal (*Cun. Texts*, xv. 14, line 35). It is quite in keeping with this that we find Gilgameš (Orion) with his ship (Argo), the Bull, and the river Eridanus (cf. Eridu in Chaldæa?) in close proximity to one another among the stars.

The most ancient names of months so far identified, viz. those current in the period of Lugalanda and the earlier Sargon, are not directly connected with the signs of the zodiac. The relation is of a more indirect kind, inasmuch as the festivals of the gods (including, in particular, Nin-Girsu = Ninib, Ish-khanna, the Scorpion-goddess, Bildár, and Ba'u, and also, even at that early date, Tur-zi = Tammūz) are of astral origin. Nevertheless, in the case of the Sumerian series, traceable from the age of the kings of Ur and current till the later Bab. period—a series which must at one time have begun with the ox-month (Gud-sidi = Iyyar; cf. above, the Assyr. coronation festival, and the ancient practice of intercalating a month after Nīsan instead of Adar)—the connexion with the zodiac is perfectly obvious. The reader should compare what has already been said (in dealing with the world-year) regarding the various names. The appellations Gud-sidi (Taurus), Brick-month (Gemini, and the building of the first city), the 'Ishtar month' Elūl, and the 'sacred hill' (the altar in the constellation Libra) are of themselves quite sufficient to place the matter beyond doubt.

LITERATURE.—In addition to the works mentioned throughout the article, reference may be made to the following: F. Thureau-Dangin, 'Anciens noms de mois chaldéens,' in *JA* vii. 339-343 (cf. *RAssyr* iv. 83 f., v. 73); H. Radau, *Early Babylonian History*, 1900, pp. 287-307 ('The Names of the Months'), with the very full review by F. Thureau-Dangin in *ZA* xv. 409-412; C. H. W. Johns, 'The Amorite Calendar,' in *Expositor*, 7th ser. vol. i. (1906) pp. 123-132 (cf. also the present writer's *Grundriss der Geogr. u. Gesch. des alten Orients*, Munich, 1904, p. 221, note 1); H. Winckler, 'Himmel, Kalender, u. Mythus,' in *Altor. Forsch.* ii. (1900) 354-395, and 'Astronomisches-mythologisches,' *ib.* iii. (1901) 179-211; F. X. Kugler, 'Darlegungen u. Thesen über althab. Chronologie,' in *ZA* xxii. (1908) 63-78; T. G. Pinches, *The Amherst Tablets*, London, 1908, Introd. iii. 'The Calendar' (pp. xix-xxiii).

FR. HOMMEL.

CALENDAR (Buddhist).—Buddhism has no general system of its own for measuring times and seasons. In the land of its birth the new religion was, in almost every particular, influenced by prevailing Brāhmanical thought and practice. In ancient India the months were lunar, and the calendar varied in different parts of the country. Every month, including the intercalary, or thirteenth, had its *māhātmya*, or 'excellence.' The Buddhist year was based upon the ancient Brāhmanical rule that every new-moon day (*darśa*), and every full-moon day (*paurṇamāsa*), should be set apart for religious observances. In later times the intermediate quarter-moon days were also held sacred. The number of fast days (*upavasatha*) was consequently increased in Buddhism to four every month, or one per week.

Another Hindu idea was incorporated into Buddhism in its observance of seasons. Hinduism celebrated the junction of six seasons, viz. spring, summer, the rains (*varṣa*), autumn, winter, and the season of dew and mist. Buddhism added to these others of its own, but now generally observes only three seasons—summer, the rains, and winter.

The festival of the New Year has been universally observed from earliest times. It celebrates the victory of light over darkness. In Buddhist countries it signifies the triumph of Buddhism over ignorance. The corresponding Hindu festival is called *Makara Saṅkrānti*. In India, this marks the termination of the inauspicious month Pauṣa, and the beginning of the sun's northern course (*uttarēyaṇa*) in the heavens.

Four eras are commonly current among Hindus in India, but none is of Buddhist origin. In Burma, however, the third, the religious era, dates from 543 B.C., the year in which Gautama Buddha is supposed to have entered *nirvāṇa*.

In China the Buddhists have arranged their calendar of festivals and fasts to suit the Chinese months, which are lunar. In the popular calendar there is no mention of anything astronomical. Cf. art. CALENDAR (Chinese).

In Ceylon each Buddhist monk is supposed to keep a calendar (*lita*), from which he learns the *awach-hāwa* (the length of the shadow, by which, according to rules laid down, varying with the time of year, the hour of the day may be known), the age of the moon, and the years that have elapsed since the death of Buddha.

In the Japanese calendar, as introduced from China, the year is divided into lunar months (see CALENDAR [Japanese]). In 1872 the Japanese Government decided to discontinue the system of lunar months and adopt the Gregorian calendar.

The Tibetan system of reckoning time is of mixed Western and Chinese origin. It is by the twelve year and sixty year cycles of Juppiter, which have been derived through India from the West, but with the substitution of some Chinese astrological terms for the Indian, the Tibetans having derived their chronological system mainly from India, with their Buddhism.

In all Buddhist lands the weekly fast is more or less strictly observed. The commemorative and other festivals, in the various countries, differ considerably, both in regard to the time of their observance and the manner in which they are celebrated.

See, further, FESTIVALS (Buddhist).

LITERATURE.—Monier-Williams, *Brahmanism and Hinduism*[4], 1891, also *Buddhism*, 1889; A. M. B. Irwin, *The Burmese Calendar*, 1901; R. Spence Hardy, *Eastern Monachism*, 1850; J. G. Scott, *The Burman*, 1882, 1896, also *Burma*, 1906; *Ceylon Almanac*, 1862; Edkins, *Chinese Buddhism*, 1880; William Bramsen, *Japanese Chronological Tables*, 1880; L. A. Waddell, *Lhasa and its Mysteries*, 1905.

J. H. BATESON.

CALENDAR (Celtic).—**1. Precedence of night.**—A certain knowledge of astronomy is ascribed to the Druids by Cæsar (*de Bell. Gall.* vi. 14: 'They discuss and impart to the youth many things regarding the stars and their motion, the extent of the universe and the earth') and Pomponius Mela (iii. 2), and some passages of Irish texts support their statements. But this knowledge probably did not surpass the primitive astronomy of barbaric races everywhere, sufficient to adjust roughly the lunar and solar years; and it was doubtless mingled with astrology (see DRUIDS). Our acquaintance with the old Celtic calendar depends mainly on a few classical references, on scattered notices in Irish and Welsh texts, and on the fragments of the calendar of Coligny. The Celtic year was a lunar year. This is attested by a passage in Pliny (*HN* xvi. 44) referring to the plucking of the mistletoe by the Druids. This is done 'ante omnia sexta luna, quae principia mensium annorumque his facit, et seculi post tricesimum annum, quia jam virium abunde habeat nec sit sui dimidia.' While it has been supposed from this passage that the Celts counted periods of time from the sixth day of the moon, there is reason to believe, as de Ricci points out (*RCel* xix. 26), that 'the phrase *quae . . . facit . . . tricesimum annum* is a general indication of the place of the moon in the Gaulish calendar, and that the subject of *facit* represented by *quae* is *luna* and not *sexta luna*.' Thus each month, year, and cycle of thirty

years would begin with a new moon, not on the sixth day of the moon (cf. Jullian, *Recherches sur la rel. gaul.*, Bordeaux, 1903, p. 63, where this view is also adopted). This custom of counting time by the moon is further attested by Cæsar (*de Bell. Gall.* vi. 18), who says that the Gauls 'define the divisions of every season, not by the number of days, but of nights; their birthdays and the beginning of months and years they observe in such an order that the day follows the night.' Many passages in Irish and Welsh texts show incidentally that this method of counting by nights prevailed; 'three nights' or 'nine nights' are frequently referred to, or a space of time is counted from such a night; or, when a certain number of days and nights is referred to, 'nights' precedes 'days.' Generally also when 'night' is used, it means a night and a day (cf. our 'se'nnight,' 'fortnight'). This is in accordance with Indo-European usage (see Schrader, *Reallex. der indoger. Altertumskunde*, Strassburg, 1901, p. 845 f.).

2. **The calendar of Coligny.**—A number of bronze fragments of a calendar were discovered, together with fragments of a statue of a god, at Coligny, near Lyons (the region formerly inhabited by the Sequani), in 1897. The calendar had probably been set up in a temple dedicated to the god. While some philologists have maintained that its language is Ligurian, it is generally believed to be Celtic, though its place in the Celtic group is not precisely fixed. The calendar is generally dated towards the second half of the 1st cent. A.D. The fragments as restored show that it had been engraved on a long bronze tablet, and that it covered at least a period of five years. There are in all sixteen columns, fourteen of which give vertically four months each, and two three months each; in all, sixty-two months. These two columns are headed by an intercalary month, which occupies double the space of an ordinary month. Each month is headed by its title, preceded in the case of the month called *Samon* by the word MID, and in other cases by the initial M. This word *mid* has been explained as meaning 'month' (*RCel* xix. 215, xxi. 23; cf. Ir. *mí*, Welsh *mis*, 'month'); but Loth contests this interpretation (*RCel* xxv. 130). To the title are added in the case of months of 30 days, MAT, and in the case of months of 29 days, ANM, except in the case of the month *Equos* of 30 days, which has ANM. Seven months have 30 days, and five 29 days. Each month has its days numbered from 1 to 15; then follows the word ATENOUX, and the remaining days are again numbered 1 to 14 or 15. When they are 14 in number the word DIVERTOMV or DIVORTOMV follows. Each number is followed by symbols, initial letters, or words, the significance of which, save in a few cases, has not been discovered, and is preceded by a small circular hole in which a peg may have been inserted to mark each day as it arrived. The names of the months as they occur in the calendar are:

Samon (30 days)	Giamon (29 days)
Duman or Dumannos (29 days)	Simivis (30 days)
Rivros (30 days)	Equos (30 days)
Anacan or Anacantlos (29 days)	Elembiv (29 days)
Ogron (30 days)	Edrini (30 days)
Cutios (30 days)	Cantlos (29 days)

The name of the intercalary month of 30 days is Ciallos.

Samon is the summer-month, from **samo-* (cf. O. Ir. *sam*, 'summer'); *Giamon*, the winter-month, from **gaiamo-* (cf. Old Welsh *gaem*, 'winter'); *Ogron*, 'cold' (cf. Welsh *oer*= **ogro-s*, 'cold'); *Rivros*, the month of the god Rivos, the harvest-month, probably August. Rivos, according to Rhŷs, is the god whose statue was found along with the calendar. He is represented as Apollo, or perhaps as Augustus in the rôle of Apollo. Augustus, who had given his name to the month of August, was chosen to represent Rivos, the god whose name gave the month *Rivros*=August (see Rhŷs, *Trans. 3rd Inter. Cong. Hist. Rel.*, Oxford, 1908, ii. 223 ff.).

The calendar is obviously lunar. The months are roughly lunar months; seven of 30 days each and five of 29 days each give a year of 355 days, instead of the usual lunar year of 354 days as with the Greeks. Loth (*RCel* xxv. 120) compares for this extra day the Irish, Welsh, and Breton phrase in contracts, promises, etc., 'a year and a day,' and states that the formula belongs to an epoch when the lunar year varied in duration from time to time by a day. While the popular current year of 354 days was retained, all chance of error in fulfilling the contract was avoided by prolonging the duration of the contract by a day; and it may have been religious and judicial scruples which led the Druids officially to augment the year by a day. We may compare Numa's Roman year (lunar) of 355 days, the number being decided because of the belief in the virtue of odd numbers. In the calendar of Coligny a month of 30 days is intercalated every two and a half years, in effect making each year a year of 367 days. This is evidently part of a system by which a given number of lunar years was made to synchronize with a given number of solar years.

De Ricci (*RCel* xix. 217, xxi. 25) finds the key to the system in Pliny's reference to a period of 30 years. In 30 lunar years, with 30 days intercalated every 2½ years, there are 11,010 days, the difference between this and 30 solar years of 365·24 days (=10,957·20 days) being 52·80 days. De Ricci supposes (1) that every 15 years a month of 29 days was omitted, equivalent to 58 days in 30 years, thus reducing the difference to a fraction over 5 days; or (2) noting that the month Equos, of 30 days, has attached to it the letters ANM, reserved for months of 29 days, he supposes an error in the drawing up of the calendar. Altering Equos to a month of 29 days, and including the intercalary days (=366 days in the year), we obtain in the 30 years' cycle 10,980 days. In 30 solar years there are 10,957·20 days, which is nearly equivalent to 371 lunations of 29·53 days, viz. 10,955·63 days. If, then, a month of 30 days were omitted from the calendar every 30 years, this would give 10,950 days, increasing the error by 5·63 days. These, however, are problematical solutions, and it is unlikely that those who framed the calendar knew with mathematical exactitude the true duration of solar and lunar years. On the other hand, if they reckoned a solar year as consisting of 366 days, and if we assume the error in the month Equos, then the intercalated month of 30 days would give, in 2½ years, 915 days—exactly the number of days contained in 2½ solar years of 366 days. On such a system, if Equos were really a month of 30 days, the solar year may have been reckoned as containing 367 days, which would produce the same result.

The intercalary month of thirty days in 2½ years, equivalent to twelve days in each year, has its days called by the name of the months in the calendar, beginning with Samon. Thus the twelve names are repeated two and a half times. Among the Germans and Hindus, as well as among the Celts, are found traces of twelve intercalary days or 'nights' in the year; and relics of the custom still exist in Brittany, where the first twelve days of January or the last six days of December and the first six of January are called *gourdeziou*, or 'supplementary days.' There is evidence also of their existence in Wales, where the twelve days added to the lunar year of 354 days were called *Dyddiau Dyddon*, 'days of days' (William ab Ithel, *Barddas*, Llandovery, 1862, p. 422 ff.), equivalent to the 'blank days' of the Welsh laws. We are thus, evidently, in presence of an old Indo-European method of accommodating the lunar year of 354 days to the solar year of 366 days (Loth, *RCel* xxiv. 310, xxv. 118). But in Brittany each of these days is regarded as prognosticating the character or quality of a month in the coming year. With this may be compared the fact that in Brāhmanic belief the twelve days are 'an image of the coming year' (Schrader, *op. cit.* p. 391). De Ricci, therefore, surmises (*RCel* xxiv. 316) that this superstition was entertained by the framers of

the calendar, and that it is denoted by the fact that the days of the intercalary month bear the names of the thirty months which follow, and in the same order.

On one of the fragments which contains the month *Ciallos* that name is followed by *Sonnocingos* and a mutilated passage, which appears to refer to a 13th month and a year of 385 days, *i.e.* the lunar year of the calendar (355 days), plus a month of 30 days. *Sonnocingos*, according to Loth and Thurneysen, means 'course of the sun,' while Loth supposes *ciallos* to be connected with a root *ki*, 'to collect,' giving it the meaning of 'collection' or *résumé*—'an etymology confirmed by the fact that the intercalary month *collects* in effect the 12 intercalary days of 2 years, and the half of these 12 or 6 days of the first half of the third year' (*RCel* xxv. 119, cf. xxi. 14, 23).

A fragment of another calendar was discovered in 1802 in the Lake of Antre, near Moirans (Jura); on it the month *Ogron* appears to be mentioned (Villefosse, *Comptes Rendus de l'Acad. des Inscr.* xxvi. [1898] 256).

3. Division of the year.—Apart from counting by months or moons, the earliest division of time was probably by seasons rather than by years—summer and winter, and later also spring. The fourth season, autumn, was with the Aryans the last of the seasons to receive a distinctive name (Taylor, *Origin of the Aryans*, London, n.d., 164, 187; cf. also Schrader, *op. cit.* 366 f., 395–7). The adaptation of the lunar months to a course of the seasons finally issued in the attempts to synchronize lunar and solar time, but it is doubtful whether among the Celts generally the course of the year was divided by the equinoxes or solstices. Traces of the division by 2, 3, or 4 seasons are found in Celtic remains. Like the Teutons, they divided the year primarily into two parts. This is shown by the calendar of Coligny, since the intercalary month appears now before Samon, now before Giamon, each of them the first of six months. It appears also from Irish texts, which tell that 'the year was divided into two parts, *i.e.* the *Samradh*, from Beltine to Samfhuin, and the *Geimhredh*, from Samfhuin to Beltine' (cited in O'Donovan, *Book of Rights*, Dublin, 1847, Introd. liii.). The year is also expressed by *dá se mis*, 'twice six months,' in the Irish laws, where also a division into two unequal parts is referred to—*Samh-fucht*, a summer period of five months, and *Gamh-fucht*, a winter period of seven months. But 'this division was evidently made to regulate the price of grazing lands' (O'Donovan, lv.). In Welsh texts two divisions also occur, the calends of May (*Calan Mei*, May 1st), and the calends of winter (*Calan Gayaf*, Nov. 1st) (*Ancient Laws of Wales*, ed. Owen, London, 1841, i. 396, 588). The year probably began with the winter half; this seems to have been the case in Ireland, where *Foghamhar* ('the harvest') is defined as the name given to the last month, and where the year commenced with *Samhain* (*Samfhuin*), the day of the feast of Tara, *i.e.* Nov. 1st; cf. the phrase 'from one feast of Tara to another' (O'Donovan, liv. f.; Loth, *RCel* xxv. 126). In the Isle of Man, the beginning of the year with *Samhain* is still commemorated by mummers, who, on its eve, go round singing, 'To-night is New Year's night, Hogunnau' (Kelly, *Eng. and Manx Dict.*, Douglas, 1866, *s.v.* 'Blein'). There was also a custom of reckoning years as winters, *e.g.* Kulhwch's horse is said in the *Mabinogion* to be four winters old (Rhŷs, *Celtic Heathendom*, London, 1888, p. 360). The calendar of Coligny affords no evidence as to whether *Giamon* or *Samon* began the year. But if *Rivros* is the harvest month, approximately August, and if *Ogron* means 'cold,' then *Samon* cannot be May, since that would make *Ogron*, a cold month = September. Probably, therefore, *Samon* is approximately June, and *Giamon* approximately December. Loth (*RCel*, xxv. 130) points out that the name *Mid Samon* is almost exactly equivalent to the Welsh, Breton, and Irish names for June (Ir. *mís mithemain* = *međ-ŝamain* = *medio-samoni-*, 'middle of summer'). In this case the twofold division of the year in the calendar differs from that followed in Ireland and Wales, though, if *Mid Samon* is 'middle of summer,' there is here a trace of the division which made summer begin with May.

A threefold division of the year may have obtained among the Celts at some period. In all Aryan languages there is no primitive name for autumn—the last of the four seasons to receive a name. For the Celts this appears from the fact that, out of the Celtic names for the four seasons, three only are Indo-European,—those of winter, spring, and summer,—while those for autumn have arisen during the Celtic epoch. Some passages in the Welsh laws may point to this threefold division (Loth, *RCel* xxv. 127 f.). Possibly, too, the triple Celtic *Matres*, goddesses of that fertility with which the course of the seasons was connected, may owe their number to a threefold division of the year.

The later fourfold division is shown clearly by the old Irish method of arranging the four seasons, arrived at by subdividing the two halves of the year:

A. Geimhredh (winter half)	1st quarter, *Geimhredh*, beginning with the festival of *Samhain*, Nov. 1st.
	2nd quarter, *Earrach*, beginning Feb. 1st (sometimes called *Oimelc*).
B. Samhradh (summer half)	3rd quarter, *Samhradh*, beginning with the festival of *Beltane*, May 1st (called also *Cét-soman* or *Cét-samain*, 1st day of *Samono-s*; cf. Welsh *Cyntefyn*).
	4th quarter, *Foghamhar*, beginning with the festival of *Lughnasadh*, Aug. 1st (sometimes called *Brontroghain*).

For the texts and for the old explanations of these names, see O'Donovan, lii. ff.

This fourfold division must have been general over the Celtic area, for traces of the great festivals, with which three of the divisions began, still survive in folk-custom or can otherwise be discovered. Thus survivals of *Samhain*, *Beltane*, and *Lughnasadh* are found in Brittany, Ireland, Wales, the Isle of Man, and the Scottish Highlands, while a festival in honour of the god Lug occurred in Gaul on Aug. 1st (see these fully discussed under FESTIVALS [Celtic]). Traces of a festival to open the spring are lacking. If such a festival existed, it is now completely effaced by St. Bridget's Day, Feb. 1st. The ritual of these festivals, in accordance with the Celtic rule that night preceded day, began on the evening before with the moon's rising (*RCel* iv. 189; Monnier, *Traditions comparées*, Paris, 1854, p. 222).

None of these festivals is connected with the times of equinox and solstice. This points to the fact that originally the Celtic year was independent of these, that 'it was more thermometric than astronomical, and the Lugnassad was, so to say, its summer solstice' (Rhŷs, 419; Lughnasadh comes midway between Beltane and Samhain in the summer half of the year). On the other hand, there is ample evidence in folk-custom over the whole Celtic area, as in general over Europe, of the ritual observance of Midsummer day, June 24th, and its eve, while this ritual is scarcely to be distinguished from that of Beltane. It has been argued that the ritual of an old pagan summer feast was transferred, under Christian influence, to that of St. John Baptist on Midsummer day, and tradition in Ireland alleges that the change from Beltane to this feast was made

by St. Patrick (O'Donovan, li.; cf. Bertrand, *Rel. des Gaulois*, Paris, 1897, p. 105; Hyde, *Lit. Hist. of Ireland*, London, 1899, p. 91; Keating, *Hist. of Ireland*, tr. O'Mahony, 1866, p. 300; Grimm, *Teut. Mythol.* ii. 624). But, in spite of the Christian elements in the Midsummer festival, which at all events denote a desire to bring it under Church influence, the pagan elements, even in folk-custom, are strongly marked, while the festival is so deeply rooted in an earlier paganism all over Europe that this theory of transference must be given up. Without much acquaintance with astronomy, men must have noted the period of the sun's longest course from very early times; and it would probably be observed ritually. Whether this ritual observance existed before that of Beltane, or whether the two feasts arose independently and entered into competition with each other, it is impossible to say. Perhaps Beltane was an early pastoral festival marking the beginning of summer, when the herds went out to pasture (in its ritual cattle were passed through the fire), and Midsummer was a more purely agricultural festival. And, since their ritual aspect and purpose are similar, they may have borrowed each from the other, thus representing different currents of early custom. Or they may be later fixed dates of an earlier movable summer festival. Practically we may now regard them as twin halves of such a festival (see FESTIVALS [Celtic]). The Celts may have observed in some fashion the solstices and equinoxes, as the survivals of Midsummer Day tend to show, and as may be suggested by such facts as that of the Helvetii appointing a day close to the March equinox for an assembly of forces, perhaps because this was a sacred day (Cæsar, *de Bell. Gall.* i. 6). Some trace of this may also be found in the phrase 'from the middle of spring to the middle of autumn,' *i.e.*, according to the old computation, from mid-March to mid-September, in each case near the time of the equinoxes. (The phrase occurs in 'Destruction of Da Derga's Hostel,' *RCel* xxii. 167.)

The solar arrangement, however, did not affect the Samhain festival at the beginning of the Celtic year, or that of Lughnasadh. These remained, and still remain in folk-custom, constant. Probably very ancient village rituals for fertility, which may have been more or less liable to variation in the time of celebration, mark the origin of these greater periodic Celtic festivals. The latter were connected mainly with the anthropomorphic divinities of growth and with magical rites to induce fertility, and were apparently, in some cases, held at a stated centre in each large district. Where the Celts came under Roman influence, the observance of the Roman calendar tended to dislocate some of the festivals. Thus, in Gaul, much of the ritual of Samhain was transferred to the calends of January. Germanic influences may elsewhere have affected the Celtic calendar, since some of the Samhain ritual has passed over to Yule. The influence of the Christian calendar, with its list of feasts and saints' days, must also be taken into account. Not only did the introduction of the Roman calendar finally demolish the old Celtic method of computing time, but the Church attempted, with varying success, to hallow the older ritual by giving it a Christian colouring or by substituting holy days for the old festivals. Thus All Saints' and All Souls' Days occupy the place of Samhain; St. Bridget's Day occurs on Feb. 1st; St. John Baptist's Day at Midsummer; Lammas at Lughnasadh. Again, while some of the ritual of the old festivals still survives on their actual date in folk-custom, some of it now occurs on saints' days within the range of the pagan festival days. Specially is this the case with the Samhain ritual, some of which is found on St. Martin's Day (Martinmas) and on other saints' days in Nov. and Dec., while in Wales and the Isle of Man Lughnasadh rites occur on the first Sunday in August (see Rhŷs, 421 f.).

4. Periods of years.—Certain periods of years seem to have been regarded by the Celts as significant, perhaps as sacred. In Irish and Welsh texts these periods are referred to as if they were well-marked divisions of time; or certain events, mythical or historical, are mentioned as occurring within them or are dated by them, showing that the mental outlook of the scribe, or of the folk among whom such traditional events were told, had been prepossessed by the influence of these periods. In the calendar of Coligny, 2½ years is clearly marked out as such a period, and the same period is mentioned in Irish texts, *e.g.* king Laegaire entered Leinster at the end of 2½ years (*RCel* xiii. 52). But the period of 3 years is much more usual. This is due, doubtless, to the sacred character of the number three among the Celts, as is evidenced by the three-headed gods and the number of triads, Divine, mythical, and customary, etc., in Celtic belief (cf. Rhŷs, Index, *s.v.* 'Three'; Usener, 'Dreiheit,' *Rhein. Mus. f. Phil.* lviii. [1903] 31). Note especially the three gods of Danu, the triple war-goddesses, triple Matres, the three cranes, three blemishes, three satires, the grouping of heroes by three, the triads of Welsh literature, etc. Wishes are made for three years; mythic kings reign for the same period; and—still more significant—the fair of Carman, celebrated at Lughnasadh, was held every three years (Windisch and Stokes, *Ir. Texte*, Leipzig, iv. [1900] 273; *RCel* xv. 312). In the Welsh *Mabinogion* and in the Welsh laws the same period occurs as a round measure of time (Loth, *Mab.*, Paris, 1889, i. 83, ii. 25, 30; *Anc. Laws*, i. 263, 488). Still more frequent both in Ireland and in Wales is the period of 7 years, which had evidently a well-marked and sacred significance, due, doubtless, to the fondness for the number itself. Thus mythic kings very frequently reign for that time; various events happen every 7 years, or occur at the end of 7 years, or continue during 7 years (Loth, *RCel* xxv. 138 ff., 147 ff.). The feast of Tara, held at Samhain, was celebrated every 7th (or perhaps every 3rd) year (O'Donovan, l.). Finally, the period of 30 years, referred to by Pliny, is mentioned as a round number of years in certain passages in Irish texts (Loth, *RCel* xxv. 140). In the absence of definite statements regarding such periods of years in the calendar of insular Celts, these references must be taken for what they are worth, but they seem at least to indicate the actual measurement of time by 3 and 7 years.

5. The month.—The oldest Indo-European name for periods of time was the 'month'; and there are traces, among the Teutons, Slavs, and other peoples, of a custom of grouping the months by two, considering them as brothers, as male and female, or as full and empty months, and using one name for two successive months qualified by 'great' and 'little,' etc. (Grimm, *op. cit.* ii. 788). Loth (*RCel* xxv. 124) considers that this usage may have been current among the Celts, since with some groups six of the twelve months have taken Latin names, as if originally each two months had but one name, while, occasionally, one month still bears popularly the name of the preceding month qualified by 'little.' Be this as it may, a primitive method of dividing the months into half-months by the light half and dark half of the moon is found among the Celts. In Celtic ritual the influence of a waxing or waning moon

was believed to be significant (see NATURE [Celtic]). Hence the lunar month was naturally divided into two parts, one before and one after full moon, in accordance with primitive usage. The calendar of Coligny divides the first 15 days from the second 15 (or 14), which are also numbered consecutively from 1 onwards, and between each half is placed in large letters the word ATENOUX, indicating the night of the full moon, 'great night,' or, as Thurneysen translates it, 'renewal' (*Ztschr. f. celt. Phil.*, Halle, 1899, ii. 523 ff.; cf. Mid. Ir. *athnughudh*), the period at which the month renewed itself. The same division occurs in Wales, where *pythewnos*, a fortnight, means 'a fifteen night,' and in Ireland, where *cóicthiges* had a similar meaning and where *teóra cóicthiges* meant 'three fifteens,' *i.e.* a month and a half (Loth, *RCel* xxv. 131; Rhŷs, 361).

6. The week.—Indo-European names for the week were late in being devised, and it is doubtful whether with the Celts, in spite of the sacredness of the number 7, a week of 7 days or nights existed before Christian influences were felt among them. Thus the Irish *seachtmain*, 'a week,' is due to Christian missionary teaching and is a corruption of Lat. *septimana* (cf. Gael. *seachduin*, Cornish *seithun*, Bret. *sizun*). The new week in Wales was, however, called by a native name, *wythnos*, 'eight nights,' in accordance with the custom of reckoning a period with the night on which it began and the night on which it ended. Thus *wythnos* would be equivalent to 7½ days, and it is possible that here the name of an earlier subdivision of the *pythewnos* has been used for the later week of 7 days. Native to the Celts are periods of 9 and of 3 nights and days. The number 9 is of frequent occurrence and evidently of sacred significance in Celtic texts, and a period of 9 nights, or of 9 nights and days, is found as a well-marked portion of time in Ireland, and is called by Rhŷs (*op. cit.* 360) 'the nine-night week.' In Irish its title is *nómad*, 'a space of 9 days' (Stokes, *RCel* xxii. 428); cf. *co cend nomaide*, 'until the end of a ninth,' *i.e.* of a 9-night week,—a phrase of frequent occurrence in the texts (cf. *RCel* xxii. 193),—while delays of 9 nights and periods of 9 nights are found in the Irish laws (Rhŷs, *op. cit.* 363; Loth, *RCel* xxv. 134; D'Arbois de Jubainville, *Études sur le droit celt.*, Paris, 1895, i. 365, ii. 112). Equally in Welsh texts and laws the same period is found, *e.g.* delays of 9 days (*Anc. Laws*, i. 84, 94, 142, etc.), while both in Wales and Ireland the names for the 9-night week were sometimes applied popularly to the new week.

Rhŷs (*op. cit.* 363) supposes that the 9th night was held to contain all the others, 'as being the boundary or limit within which the week was comprised.' If this be so, in accordance with the old rule of counting the night with which a period ended as well as that with which it began, the period consisted of 9 nights and 8 days. Thus a 'day' must have intervened between each week, if each began with a night, unless, as is probable, the 9th night originally ended one week and began another, *i.e.* it was common to both. Later the period is one of 9 nights and 9 days. Rhŷs also finds mythical personifications of the 9-night week according to two methods, and he cites cases of 9 personifications of a more or less uniform character, or a single personification with the attribute of 9 attaching to it (*op. cit.* 366 ff.). These must be regarded as hypothetical. Probably the 9-night week was divided into halves called *noinden*, of 5 nights and 4 days (cf. the *cess noínden Ulad*, 'the Ulster men's sickness of a week,' explained as 5 nights and 4 days). If 2 *noínden* thus made up the 9-night week, the 5th night must have been reckoned to each half, ending one and beginning another, as the 9th night also ended one week and began another (cf. Rhŷs, 363, 368, 370).

The week of 9 days being found among many races, its origin has been sought in various ways. Some have seen in it a multiple of the sacred number 3 (cf. the numerous triads and enneads of beings in 'Da Derga's Hostel,' *RCel* xxii. *passim*); others have adopted Kant's view that, before the synodical month of 29½ days was adopted, the sidereal month of 27⅓ days, divided into three parts, originated the period of 9 days (Loth, *RCel* xxv. 135 f.); Rhŷs offers another but by no means convincing explanation (*op. cit.* 364).

If the sidereal month divided into three parts produced roughly a period of 9 days, this again divided by 3 gave a period of 3 days. In any case 3 was a sacred number with the Celts, and a period of 3 days and nights occurs frequently in Irish and Welsh texts. Thus a delay of 3 nights in judicial matters is frequent (D'Arbois de Jubainville, *op. cit. passim*), and 3 nights and days of fasting, of hospitality, of a sojourn, of a journey, of a truce, etc., are common (Loth, *RCel* xxv. 132 f.; 'Tain bo Fraich,' *ib.* xxiv. 132; 'Finn and the Man in the Tree,' *ib.* xxv. 347, etc.).

7. The day.—The old Celtic names of days have been replaced by others borrowed from other sources and due to Latin and Christian influences (see MacBain, *Etymol. Dict. of the Gaelic Language*, Inverness, 1896, p. 117 f.). As has been seen, the days during which the moon was waxing were with the Celts, as with other peoples, considered propitious for many undertakings, especially for ritual purposes. This is gathered mainly from later folk-survivals; but older evidence is found in the case of the mistletoe cut on the 6th day of the moon, and in the fact that the Celtiberians danced in honour of their god on the night of the full moon (Strabo, III. iv. 6). Some evidence of 'lucky' days is also derived from the Irish texts (cf. *e.g.* 'Songs of Buchet's House,' *RCel* xxv. 27). Certain days, or groups of days, as well as certain hours of the day or night, were doubtless considered lucky or unlucky, as popular survivals show. Midday and midnight, according to Lucan (*Pharsal.* iii. 404 ff.), were hours when the Divine guardian of the grove showed himself, and when the priest himself dreaded to approach it. Certain days were appropriated to greater or lesser festivals, *e.g. Samhain, Beltane, Lughnasadh*, on the first of the respective months, as well as to other periodic festivals, in some cases to divinities on their festal days—the communal sacrifice of the hunters of Galatia to their Artemis 'on the day of her birth' (Arrian, *Cyneg.* 33), the yearly sacrifices of the Irish to Cenn Cruaich (*RCel* xvi. 35), the periodic holocausts of the Gauls (Diod. Sic. v. 32). Reference may also be made to the meeting of the Druids of Gaul 'at a fixed time of the year' (Cæsar, *de Bell. Gall.* vi. 13).

LITERATURE.—J. O'Donovan, *The Book of Rights*, Introd., Dublin, 1847; J. Loth, 'L'Année celtique,' *RCel* xxv. [1904] 113 ff.; J. Rhŷs, *Celtic Heathendom*, London, 1898; E. K. Chambers, *Mediæval Stage*, Oxford, 1903; H. D'Arbois de Jubainville, *Études sur le droit celtique*, Paris, 1895; G. Dottin, *Manuel pour servir à l'histoire de l'antiquité celtique*, Paris, 1906. For the calendar of Coligny: Dissard, *Comptes Rendus de l'Academie des Inscriptions*, xxv. [1897] 703 ff., xxvi. [1898] 161 ff., 299 ff., *Bulletin des Antiquaires*, Paris, 1898, p. 150; Espérandieu, *Calendrier de Coligny*, Saint-Maixent, 1898, *RCel* xxi. (1900), 2 suppl. plates; Allmer, *Calendriers celtiques de Coligny . . . et du lac d'Antre*, Vienna, 1899; Thurneysen, *Ztschr. f. celt. Phil.*, Halle, ii. [1899] 523 ff.; Seymour de Ricci, *RCel* xix. [1898] 213 ff., with plates, xxi. [1900] 10 ff.

J. A. MACCULLOCH.

CALENDAR (Chinese).—The Chinese calendar, which was practically copied by the Japanese, with the substitution of Japanese for Chinese names, is scarcely so ancient as is generally supposed. It is true that at an early period the Chinese became acquainted with a twelve-year cycle of Juppiter, depending on that planet's progress through the twelve signs of the zodiac; but this cycle had in China only astrological significance, whereas in India it became part of the calendrical system. It is equally true that the Chinese early endeavoured to formulate a luni-solar year, and there is evidence of a year of 360

days side by side with one of 366 days, the discrepancy between the latter and the purely lunar year of 354 days being adjusted by intercalation at intervals of three or five years. Chinese tradition ascribes to the Emperor Yao (24th cent. B.C.) the institution of an astronomical board for the regulation of the calendar, and this tribunal, which still issues the official calendar each year, was profoundly influenced by the science of the Jesuit missionaries of the seventeenth century.

1. **Era.**—The Chinese have no initial point from which succeeding years are numbered. When recording dates, they usually give the name of the Emperor and the year of his reign (the first year of his reign being reckoned as beginning on the New Year's Day after his accession), as is the practice in England with regard to Acts of Parliament. Besides this, however, they also employ a sexagesimal cycle, beginning with 2637 B.C., for the years and days, and, to a limited extent, for the months. The basis of this cycle is the five elements, wood, fire, earth, metal, water (*mu, huo, t'u, kin, schui*), which, being divided into antitheses (active-passive, male-female, etc.), give the sub-cycle of the ten heavenly stems (*kan*): *kia* ('growing wood'), *yi* ('building wood'), *ping* ('natural fire'), *ting* ('artificial fire'), *wu* ('earth'), *ki* ('earthen ware'), *keng* ('metal'), *sin* ('wrought metal'), *jin* ('running water'), *kuei* ('standing water'). The second sub-cycle is formed by the twelve earthly branches (*tschi*), each designated by the name of an animal. This duodenary cycle, which is also found in Tibet, among the Tai and Khmer, and, at least in part, in Egypt, Old Turkish inscriptions, and the Turfān fragments (Ginzel, *Chronologie*, i. 85 ff., 404, 411, 413, 501 f.; F. W. K. Müller, '"Persische" Kalenderausdrücke im chines. Tripitaka,' in *SBAW*, 1908, pp. 460–463), is as follows: *tsě* ('mouse'), *tscheu* ('ox'), *yin* ('tiger'), *mao* ('hare'), *schin* ('dragon'), *szě* ('snake'), *ngu* ('horse'), *wei* ('sheep'), *schin* ('monkey'), *yeu* ('cock'), *siü* ('dog'), *hai* ('swine'). The *kan* and *tschi* are grouped together, beginning with *kia-tsě*, and when the denary cycle has been repeated six times and the duodenary five times, the initial combination is repeated, and the cycle begins anew.

The year 1910 is the 47th year of the present cycle; and, as Chinese chronologers begin their cyclic reckoning with the year 2637 B.C., the present is the seventy-sixth cycle. But they have not adopted the system of numbering their cycles; and therefore a reader cannot tell to which cycle a date may belong, unless he be assisted by the context. In some historical works one finds both the cyclic number and the year of the reign given.

2. **Year and month.**—The Chinese year consists of twelve (synodic) lunar months, and is made to correspond with the solar year by the occasional insertion of an additional, or intercalary, month. The space of time covered by twelve of these lunar months being less than the solar year by 10 days 21 hours, in every nineteen years there are seven years of thirteen months. We shall now explain the rule under which the intercalary months are inserted. The length of a Chinese month is 29·53 mean solar days; and the time which the sun occupies in passing through one of the twelve signs of the zodiac averages 30·44 days. These two periods being of so nearly the same length, it happens in most cases that a Chinese month begins when the sun is in one sign of the zodiac, and terminates when it is in another sign. But, as the month is the shorter of the two periods, occasionally there must come a time when a month begins and ends when the sun still remains in the same sign. Every such month is adopted as an intercalary month; and by this simple plan there is provided exactly the right number of intercalary months to correct the divergence of the Chinese from the solar year. The intercalary month never occurs in the winter—not, as is generally supposed, because of some arbitrary rule, but because the sun (which moves faster in winter than in summer) is then travelling at more than its average rate of speed, and passes through a sign of the zodiac in less time than is occupied by a lunar month, so that at that season a month cannot possibly begin and end while the sun remains in the same sign.

At the present time the first month of the year is known in Chinese by a special name, *Tsching-yüe*, 'hallowed (or true) month'; but the remaining months are called the 'second month,' 'third month,' and so on. Anciently, however, the months were designated according to the characters of the *tschi*, which also corresponded to the twelve zodiacal signs (*kung*), although the latter were counted in reverse order. These old Chinese month-names were as follows: *Tsě-yüe, Tscheu-yüe, Yin-yüe, Mao-yüe, Schin-yüe, Szě-yüe, Ngu-yüe, Wei-yüe, Schin-yüe, Yeu-yüe, Siü-yüe, Hai-yüe*, their names being equivalent respectively to 'child,' 'bud,' 'plant-basket,' 'open door,' 'motion,' 'completion,' 'encounter,' 'laden trees,' 'ripeness,' 'jug,' 'destruction,' 'return to rest.'

An intercalary month takes its name from the month which precedes it. Thus, if it follows the fourth month, it is called the 'intercalary fourth month.' Every month begins with the first day of a new moon; and the new year begins with the first new moon after the sun enters Aquarius. New Year's day thus varies between 20th January and 19th February. As the length of a month is 29·53 days, it must consist sometimes of 29, sometimes of 30 days, the latter the more frequently.

It results from the above-described conditions that the equinoxes occur regularly in the second and eighth months, the solstices in the fifth and eleventh months.

The Chinese have no formal division of the month; but it is a common practice among them to speak of anything as happening in the first decade (1st to 10th day), middle decade (11th to 20th day), or last decade, of such a month, much as we say, 'first week in June,' etc.

The first month of the luni-solar year was originally *Yin-yüe*, as ordered, according to tradition, by Tschuan-hiü (2513 B.C.). In the second dynasty (1766–1123 B.C.) the beginning of the year had retrograded a month, in the third (1122–255 B.C.) two months, and in the fourth (255–209 B.C.) three months, until the Emperor Wu-ti, in 104 B.C., in his reformation of the calendar, is said to have made the year once more begin with *Yin-yüe*—a tradition which must not be taken too strictly.

3. **Day.**—As already noted, the Chinese divide their days into sexagesimal periods, their names being identical with those of the corresponding years:—*Kia-tsě, Yi-tscheu, Ping-yin, Ting-mao, Wu-schin, Ki-szě, Keng-ngu, Sin-wei, Jin-schin, Kuei-yeu, Kia-siü, Yi-hai, Ping-tsě, Ting-tscheu, Wu-yin, Ki-mao, Keng-schin, Sin-szě, Jin-ngu, Kuei-wei, Kia-schin, Yi-yeu, Ping-siü, Ting-hai, Wu-tsě, Ki-tscheu, Keng-yin, Sin-mao, Jin-schin, Kuei-szě, Kia-ngu, Yi-wei, Ping-schin, Ting-yeu, Wu-siü, Ki-hai, Keng-tsě, Sin-tscheu, Jin-yin, Kuei-mao, Kia-schin, Yi-szě, Ping-ngu, Ting-wei, Wu-schin, Ki-yeu, Keng-siü, Sin-hai, Jin-tsě, Kuei-tscheu, Kia-yin, Yi-mao, Ping-schin, Ting-szě, Wu-ngu, Ki-wei, Keng-schin, Sin-yeu, Jin-siü, Kuei-hai.* This cycle of days is found in the most ancient historical records, the dates of important events being recorded by mention of the cyclic day, as well as of the day of the month, month, and year of reign. These cycles, though not used for ordinary purposes, have been continued without interruption to the present time. Besides this the

Chinese have long possessed a cycle of 28 days, designated by the names of the 28 lunar mansions (*sieu, kung*):—*kio* ('horn'), *k'ang* ('neck'), *ti* ('fundament'), *fang* ('room'), *sin* ('heart'), *wei* ('tail'), *ki* ('dung-basket'), *teu* ('winnowing fan'), *nieu* ('cattle'), *niü* ('virgin'), *hiü* ('grave-mound'), *wei* ('house-ridge'), *schi* ('sacrificial hearth'), *pi* ('wall'), *kuei* ('sandal'), *leu* ('harvest woman'), *wei* ('field watchman'), *mao* ('setting sun'), *pi* ('net'), *tsui* ('mouth'), *ts'an* ('exalted'), *tsing* ('well'), *kuei* ('manes'), *lieu* ('pasture'), *sing* ('constellation'), *tschang* ('net'), *yi* ('wing'), *tschen* ('waggon'). The week of seven days, on the other hand, is unknown, except in commercial centres frequented by Europeans, where for Monday, Tuesday, etc., the names 'first day,' 'second day,' etc. (*Li pai yi, Li pai öl*, etc.), have been coined.

The day begins at midnight, and is divided into 12 *tschi* (see above, 1), each of which is subdivided into two parts, the former called *tsch'u* ('beginning') or *kiao* ('odd'), and the latter *tsching* ('even'). Each of these halves is subdivided into four *k'o*, or 'quarters' (*tsch'u-k'o*, 'beginning quarter,' *yi-k'o*, 'first quarter,' etc.); and a *k'o* falls into 15 *fen* ('minutes'), while European influence has introduced further divisions corresponding to 'seconds,' 'forenoon,' and 'afternoon.'

4. Other divisions.—An additional method of marking time is afforded by the 'Twenty-four Solar Terms,' which are divisions of a solar year, and quite independent of the official year with its twelve or thirteen lunar months. These Solar Terms commence alternately on the day of the sun's entry into a sign of the zodiac, and on the day of its reaching the 15th degree in the sign. Their length thus averages 15·22 days, though it varies between 14 and 16 days. The first term begins when the sun reaches the 15th degree in Aquarius, or approximately on the 5th of February. These 'Terms,' which are alternately odd (*tsie*) and even (*k'i*), have the following names:—*Li-tsch'ün* ('beginning of spring'), *Yü-schui* ('rain-water'), *King-tschi* ('coming-forth of worms'), *Tsch'ün-fen* ('spring equinox'), *Ts'ing-ming* ('pure clearness'), *Ku-yü* ('seed rain'), *Li-hia* ('beginning of summer'), *Siao-man* ('little fertility'), *Mang-tschung* ('grain in granaries'), *Hia-tschi* ('turning of summer'), *Siao-schu* ('little heat'), *Ta-schu* ('great heat'), *Li-ts'ieu* ('beginning of autumn'), *Tsch'u-schu* ('boundary of heat'), *Pe-lu* ('white dew'), *Ts'ieu-fen* ('autumn equinox'), *Han-lu* ('cold dew'), *Schuang-kiang* ('fall of hoar-frost'), *Li-tung* ('beginning of winter'), *Siao-süe* ('little snow'), *Ta-süe* ('great snow'), *Tung-tschi* ('turning of winter'), *Siao-han* ('little cold'), *Ta-han* ('great cold'). These terms are marked in the almanac published annually by the Government; and agricultural operations, sowing, etc., are always regulated by them. Closely connected with them is the twelve days' cycle often called the 'cycle of choice,' whose twelve signs are associated with the 24 *tsie-k'i* just enumerated, inasmuch as the last day of a *k'i* and the first day of the following *tsie* come under the same sign. The names of the signs of this twelve days' cycle, which has some connexion with astrology, are as follows:—*kien* ('attain'), *tschu* ('exclude'), *man* ('full'), *p'ing* ('indifferent'), *ting* ('determinative'), *tschi* ('seize'), *p'o* ('break'), *wei* ('dangerous'), *tsch'ing* ('complete'), *scheu* ('conceive'), *k'ai* ('open'), *pi* ('close').

Mention should also be made of the three Chinese eras *tschang, pu*, and *ki*. The *tschang* is 19 luni-solar years, when the relation between the rise of the new moon and the beginning of the *k'i* again begins; the *pu* is a cycle of 72 years, when the difference between the tropical solar year and the lunar year is very nearly equal to the product of the sidereal and synodical time of revolution of the moon; and the *ki* is equal to 20 *pu* = 1440 years, and represents 261 sexagesimal cycles.

LITERATURE.—Gaubil, 'Traité de la chronologie chinoise,' in *Mémoires de l'académie des inscriptions*, xvi., also 'Histoire de l'astronomie chinoise,' in *Lettres édifiantes*, xxvi. (Paris, 1783); H. Fritsche, *On Chronology and the Construction of the Calendar, with special regard to the Chinese Computation of Time compared with the European* (St. Petersburg, 1886); P. Hoang, *De Calendario Sinico variæ notiones* (Zi-Ka-Wei, 1885); M. Tchang, *Synchronismes chinoises* (Shanghai, 1905); G. Schlegel, *Uranographie chinoise*, i. 30, 86–485 (Leyden, 1875); F. K. Ginzel, *Handb. der mathematischen und technischen Chronologie*, i. 450–498 (Leipzig, 1906); R. Schram, *Kalendariographische und chronologische Tafeln*, pp. xxvi–xxx, 239–282 (Leipzig, 1908).

T. L. BULLOCK and LOUIS H. GRAY.

CALENDAR (Christian).—The Christian calendar derived its name (in the languages of Western Europe), as it did its form, from the Roman pagan calendar (see CALENDAR [Roman]), which it gradually superseded. The germ of the Christian calendar is to be sought in the customary observance, in each local church, of the death-days of its martyrs and bishops. Lists of these were preserved in the diptychs of each church. References to such lists meet us in St. Cyprian's letters. Writing (*Ep.* 37) about recent martyrs, he gives direction that the day of their death should be noted in order that their commemorations might be celebrated among the memorials of martyrs. In another letter (*Ep.* 34) he mentions as a well-known custom the celebration of the anniversaries of the Passions of martyrs. Tertullian (*de Corona*, xiii.), reproving Christians for taking part in pagan commemorations, reminds them that they have their own registers and *fasti*. Sozomen (*HE* v. 3) testifies in regard to two neighbouring towns in Palestine, Gaza and Constantia, that, although they were united by Julian under one civil government, each retained the festivals of its martyrs and the commemorations of the priests who had presided over it. See, further, COMMEMORATION OF THE DEAD.

1. **Calendar of Filocalus.**—The earliest festival lists which have come down to us belong to the local church of Rome. They are contained in a compilation of chronological documents of the date A.D. 354—itself a re-publication of an edition of 336. The title-page is inscribed 'Furius Dionysius Filocalus titulavit.' The name of this calligrapher is found in two inscriptions in Rome, in one of which he describes himself as 'Damasi Papae cultor atque amator.' He appears to have been employed by Damasus in designing the lettering for the metrical epitaphs which that Pope wrote for the tombs of the martyrs. The compilation commences with a civil calendar giving the national pagan festivals, but marking the Christian week by the letters A–G, which are prefixed in regular sequence to the days, side by side with the nundinal letters A–H. This probably had become a feature of the State calendar since the observance of Sunday had been legally sanctioned by Constantine in 321. There is a list of consuls from B.C. 510 to A.D. 354, in connexion with which certain Christian events are noted, viz. the birth and the death of Christ, and the arrival in Rome of SS. Peter and Paul, and their martyrdom. Other civil documents are also given. Of special Christian interest are a table of the days of the occurrence of Easter from 312 to 411, a catalogue of Bishops of Rome from Peter to Liberius, and two lists entitled respectively 'Depositio episcoporum' and 'Depositio martyrum,' which note in calendar order the days of the burial of the Roman bishops and martyrs, with the place of their interment, where the memorial service was annually held. In these two lists, which we may assume were copied from official archives, we have the calendar of the Church of Rome, as concerned immovable feasts, of the year 354.

With very few exceptions all the entries appear in the Roman calendar of the present day.

An analysis of this primitive calendar yields the following results. The 'Depositio episcoporum' contains the names of twelve bishops from Lucius (254) to Julius (352). The last two, Marcus and Julius, are inserted at the end, out of calendar order, by the second editor. One bishop of the period, Marcellus, is omitted, and another, Xystus (Sixtus), is placed in the martyr list. In the 'Depositio martyrum' 52 names appear, of which several are frequently assigned to a single day—that, no doubt, on which they suffered together, as we know to have been the case with Perpetua and Felicitas. 24 days in all are observed—Christmas, which heads the list, and St. Peter's Chair, Feb. 22 ('VIII. Kal. Martias, Natale Petri de cathedra') being included. The only entries relating to foreigners are: 'Non. Martias [March 7] (depositio) Perpetuae et Felicitatis, Africae'; and 'XVIII. Kal. Octob. [Sept. 14] Cypriani, Africas, Romae celebratur in (coemeterio) Callisti.' There is no notice of martyrs who suffered before the 3rd century. The earliest mentioned are Perpetua and Felicitas (202). The oldest Romans are Callistus (222), Oct. 14, and Hippolytus and Pontianus (235), Aug. 13. We may therefore conclude that the practice of celebrating the anniversaries of the martyrs at their graves did not arise at Rome until the 3rd century. If the festival of any martyr of the 1st or 2nd cent. had become traditional, it would hardly have failed to find mention in the 'Depositio martyrum.' The entry 'Petri in Catacumbas et Pauli Ostense Tusco et Basso Cons.' [June 29] is not the anniversary of the martyrdom of these Apostles, but the commemoration of the translation of their remains in the year 258. The collection of Filocalus was preserved until recent times in two MSS of the 8th or 9th century. One of these has totally disappeared, but two 17th cent. copies remain, one at Brussels and the other at Rome. Of the second MS, two fragments only survive in the library of Berne, but a copy made from it when entire is in the Imperial library at Vienna. (Mommsen has published the civil calendar in *CIL* i. 334, the other documents in *Mon. Germ. Auct. Ant.* ix. 13 f. For a summary of the contents of the collection, see Duchesne, *Le Liber Pontificalis*, i. 1892, p. vi. f., and see also Rossi-Duchesne, *Acta Sanct.*, Nov., tom. 2, pars i. p. xlviii. f.)

2. Gothic calendar.—A fragment of a list of martyrs, in the Gothic language, of the end of the 4th cent., has been published by Mai from an ancient palimpsest in the Ambrosian library at Milan (*Script. Vet.* v. 66), and by Migne (*PL* xviii. 878). It contains 38 days only,—from Oct. 23 to Nov. 30,—and in addition to national saints includes the Apostles Philip and Andrew, and the Emperor Constantine.

3. Calendar of Polemius Silvius.—A calendar of complete framework, *i.e.* with all the days of the year inserted, was drawn up by Polemius Silvius in 448—in an appendix he names the consuls of the following year—and addressed to Eucherius, Bishop of Lyons (d. 450). Silvius had before him another calendar, which, as he says in the preface, he set himself to simplify for the use of the unlearned. The calendar has a curious resemblance to a modern almanac. Historical dates are entered, as, *e.g.*, the day of the capture of Rome by the Gauls (Id. Feb.). The words 'Kalendæ' 'Nonæ,' 'Idus,' 'Epiphania' are explained by the author after a manner of his own. Weather indications are given. A few pagan festivals are recorded, evidently as legal or business dates. Christian commemorations are connected with 10 days only, and include Christmas, St. Stephen, Epiphany, St. Vincent (Jan. 22), the Passion (March 25), the Resurrection (March 27), St. Lawrence (Aug. 10), Hippolytus (Aug. 12), and the Depositio SS. Petri et Pauli, which is assigned to Feb. 22 instead of June 29. The Maccabees (Aug. 1)—the one OT commemoration in the West—appears here for the first time. This calendar is preserved in a single MS of the 12th cent. in the public library at Brussels (edited Boll. *Acta SS.*, June, vol. vii., Migne, *PL* xiii. 676, and Mommsen, *CIL* i. 335).

4. Calendar of Tours.—A list of the fasts and vigils in the diocese of Tours instituted by Bishop Perpetuus (461–490) finds a place in the *Historiæ Francorum* of Gregory, Bishop of Tours (x. 31). It mentions only the chief festivals, *i.e.* those preceded by a vigil. These are Christmas, Epiphany, the Resurrection on the fixed day March 27 (VI. Kal. April.—the only date given), as well as Easter and Ascension Day; also, among others, the Nativity and Passion of St. John Baptist,[1] St. Martin, St. Hilary, St. Peter's Chair (Natale S^tl Petri episcopatus), and SS. Peter and Paul. The station days, *quarta et sexta feria*, from Quinquagesima to St. John Baptist's day, are appointed for observance amongst the fasts.

5. Calendar of Carthage.—This calendar was first edited in 1682 by Mabillon in his *Vetera Analecta*, Paris, iii. 398. It was discovered by him in the monastery of Clugny, written on two parchment sheets, since lost, which formed the covering of a copy of St. Jerome's commentary on Isaiah. In this calendar, of the earlier Carthaginian bishops Cyprian (d. 258) alone is mentioned, being honoured as a martyr; eight bishops are commemorated as such, from Gratus who was present at the Council of Sardica (343) to Eugenius (d. 505). This latter date therefore marks the age of the final redaction of the calendar. From the names of the bishops, and that of St. Augustine (Aug. 29), we conclude that the calendar belonged to the Catholic Church and not to the Donatists. It begins on XIII. Kal. Maïas (19th April), and ends on XIV. Kal. Mart. (Feb. 16)—the nine weeks during which Lent occurs being omitted, either through compliance with the Eastern custom, attested by the Council of Laodicea (between 343 and 381), which discouraged festivals at that time, or simply owing to a defect in the MS. The heading is: 'Hic continentur dies nataliciorum martyrum et depositiones episcoporum quos ecclesia Cartagenis anniversaria celebrant.' Martyrs and bishops are not separated, as in the Roman calendar, but the distinction is maintained by the different descriptions—*natalicia* (birthdays, *i.e.* into the higher life) and *depositiones* (burials)—of their days in the heading. Moreover, in the list 'depositio' is prefixed to each bishop, except in the case of Cyprian (Sept. 14), who is classed among the martyrs. The number of days commemorated—79—shows a large increase when compared with the 12 and 24 of the Roman lists of a century and a half before. The calendar has also become wider in its scope: 18 foreign names appear in it, as compared with the 2 in the Roman. Among these we observe 9 Roman saints, 3 of whom are not found in Filocalus, though no doubt at this time they were commemorated also at Rome. And, as regards the African saints, they do not belong exclusively to Carthage, as the names in the Roman calendar are all Roman. Martyrs are included from the three ancient African provinces, viz. Africa proper, Numidia, and Mauretania. Festivals in honour of NT events and personages have multiplied. Christmas is now followed by its attendant feasts, St. Stephen (Dec. 26), St. John,[2] here coupled with his brother James (Dec. 27), and the Holy Infants (Dec. 28). With Christmas is also connected the day of St. John Baptist, *i.e.* his Nativity (VIII. Kal. Jul.–VIII. Kal. Jan. representing the six months' interval of Lk 1^{28}). We find also Epiphany (Jan. 6), SS. Peter and Paul (June 29), St. Luke (Oct. 13), and St. Andrew (Nov. 29). The Maccabees (Aug. 1) has now gained a firm footing in the West (see Calendar of P. Silvius above, § 3).

6. Syrian calendar.—The calendars which have hitherto occupied us were mainly of a local character. We come now to a calendar which takes a wider range, being formed by the inclusion of the Saints' lists of several Churches.

In 1837 there was discovered by Dr. Henry Tattam in the monastery of St. Mary Deipara, on the Nitrian Lakes in

[1] In the *Sacramentarium Gallicanum* the mass for St. John Baptist (*i.e.* his Nativity) is followed by a mass for his Passion (Muratori, *Lit. Rom. Vet.* 1748, 873, 9).

[2] The text has 'sancti Johannis *Baptistae*'—undoubtedly a copyist's error for *Apostoli*, as the Baptist is commemorated in the calendar on June 24.

Egypt, a codex containing—in addition to the *Clementine Recognitions*, Eusebius on the *Theophania*, and other works—an ancient calendar written in Syriac. Tattam acquired the MS for the British Museum, where it now lies. The calendar was first edited by W. Wright in the *Journ. of Sacred Lit.*, 1866, viii. 45 ff., with an Eng. tr. 423 ff., and subsequently by R. Graffin in the 2nd Nov. vol. of the *Acta Sanctorum*, lii., the names being turned into Greek by Duchesne. A note in the last page of the codex is to the effect that it was completed at Edessa in 411.

The calendar consists of two parts. Part I. is arranged according to the Roman months (to which Syriac titles are given), and contains the names of martyrs belonging to the Roman Empire. It begins on the day after Christmas (Dec. 26),[1] and ends on Nov. 24. Part II. contains a list of Persian martyrs, arranged in the order of their ecclesiastical standing as bishops, presbyters, and deacons. As no dates are given, it must be regarded as a historical record, not as a calendar of martyr-festivals.

The calendar proper (*i.e.* Part I.) is evidently compiled from the martyr-lists of the chief cities in the Eastern (trans-Adriatic) part of the Empire. Only one local Roman feast (Xystus) occurs in it, and one African (Perpetua and her companions). The place of honour is given to Nicomedia, which has been credited with by far the largest number (32) of entries. From this and other indications we may infer that the first editor had his home in Nicomedia, and wrote in Greek. The date of his work is not earlier than 362, as martyrs are recorded who are mentioned by Socrates and Sozomen as having suffered under Julian. Owing to careless editing, many saints are mentioned twice or even thrice. The names of distinguished martyrs had found place not only in their own but in other calendars, and when the lists were combined, in cases where the day of celebration differed, they were allowed to appear again and again. The compilation is made up of Arian calendars. In the list received from Alexandria, Athanasius is omitted, but Arius is included. 'At Alexandria, Areios the presbyter' is the entry opposite July 6. Lucian (of (Antioch), Jan. 7, and Eusebius (of Cæsarea), May 30, are also commemorated. Possibly also 'Eusebius,' Nov. 8, is the Arian bishop of Nicomedia. But in substance the Catholic and Arian calendars must have been much the same, as after the schism both parties, no doubt, retained the old lists, merely adding distinguished partisans. In 15 entries the words 'of the ancient martyrs' are added to the name. If, as seems likely, this means that the martyrs mentioned suffered before the persecution of Diocletian, it follows that by far the greater number of the names of this calendar date from that persecution. From Nicomedia the calendar in all probability came to Antioch, and there received the long list of martyrs, falling little short of the Nicomedian, credited to that city. Thence it was carried to Edessa, where it was translated into the Syriac vernacular, and again augmented by the addition of local saints. Here also the list of Persian martyrs was appended; and, as thus edited, the calendar in the MS of 411 has come down to us. In this calendar the only festivals other than Saints' days noted are Epiphany and Easter, the latter in connexion with the commemoration of All Martyrs, which is assigned to the following Friday. The only Apostles commemorated are SS. John and James (Dec. 27), and SS. Paul and Peter (Dec. 28). St. Stephen, who is also called an Apostle, appears on Dec. 26.

7. The Hieronymian Martyrology.—The tendency to combine local festival records in one list, which we observe in the Syrian calendar, finds its fullest development in the compilation which came to be popularly known as the Hieronymian Martyrology.[1] It comprises, as its chief elements, the calendars of Rome, Carthage, and Syria. The nucleus of the work is the Roman calendar, but of a later stage than that presented to us by Filocalus. As it appears in H.M., it shows a great increase in martyr festivals. The 22 days marked for observance in A.D. 354 have grown to some 150, and, instead of the one or two names then allotted to each day, groups—sometimes large groups—of names are almost invariably found. The calendar has, moreover, ceased to be merely urban and suburban. It includes all Middle Italy. Opposite 'Romæ' are placed festivals of places a considerable distance from the city, even as far off as Forum Sempronii, 174 miles away—the number of miles from Rome being here, as elsewhere, noted in the text. The list of Roman bishops, kept separate from that of the martyrs by the chronographer of 354, has been made a part of the general calendar, and has been continued (with the sole omission of Zosimus) to Boniface I., of whom both the consecration day (IV. Kal. Jan.) and the death day (II. Non. Sept.) are given. As the consecration day would be observed only during the lifetime of the bishop, it may be concluded that the Roman calendar was received into the work shortly after the death of Boniface (422). After Boniface only Popes of wide-spread fame appear—such as Leo the Great, Hilary, and Gregory the Great—attached to whose names often occurs a notice showing that they were exceptionally added: *e.g.* IV. Id. Sept. 'Hilarius per quem Victorius ordinem paschalem conscripsit.' With the Roman calendar were incorporated the calendars, in part or whole, of other Italian cities—which probably already formed two collections (of Upper and Lower Italy) before they came into the compiler's hands—and the calendar of Carthage. To the calendar of the West thus formed, a later editor added the Syrian festival list—that is, its first part, for of the second he seems wholly ignorant—and thus gave a kind of ecumenical character to the work. Like the Roman, the two other chief sources have been received into H.M. with augmentations, as compared, that is, with the independent forms known to us. The African list has been swollen by a number of martyrs who, it has been conjectured, suffered during the raid of Genseric, 428 (Achelis, *Die Mart.* pp. 103, 107). The Syrian calendar has been extended to 460, as the translation of the remains of St. Simeon Stylites, which took place in that year, is commemorated on Jan. 5. It is noteworthy that the editor, who evidently accepted the calendar as Catholic, has in all innocence taken over its Arian colouring, the commemoration of the two bishops Eusebius being retained, and even that of Arius himself, his name appearing in the corrupted forms Arthoci, Artotes, or Ari Thoti in different MSS.

The preface to H.M. takes the form of a letter addressed to St. Jerome by two bishops of North Italy, Chromatius of Aquileia and Heliodorus of Altinum, in which they beg him to send them from the archives of Cæsarea the famous festal calendar of Eusebius; and of his reply, stating that he was sending them this calendar in a curtailed form which included only the most notable martyrs, and with the names arranged according to the months and days of the year. It was through this fabulous association of the work with St. Jerome (d. 420) that the Martyrology received its name, and no doubt won in large measure the prominent position which it attained. The preface is first cited by Cassiodorus (*de Institutione Divin. litt.* xxxii., Migne, *PL* lxx. 1148) in 544. As H.M. must have been then in currency, its final compilation, *i.e.* that which united its Eastern with its Western elements, may be assigned to an earlier date (*c.* 530) in the 6th century. Towards the end of that cent. the knowledge of it had reached the East. In 598, Eulogius, Patriarch of Alexandria, requested Gregory the Great to send him 'the deeds of the martyrs collected by Eusebius,'—a clear reference to the preface of H.M.,—and the Pope in his reply alludes plainly to the Martyrology. The compiler of H.M. was undoubtedly a native of North Italy. The additions which he made to his ancient materials are, as we have seen, mainly

[1] The omission of Christmas is remarkable. It probably stood at the commencement of the year in the original Greek text, and was struck out by the Syrian copyist, influenced by the usage of his own Church.

[1] Hereafter cited as H.M.

Italian, and the memorials of the northern cities seem best known to him. He has also selected North Italian bishops as correspondents with St. Jerome in the preface.

A work like H.M. would naturally receive augmentations from time to time. The most remarkable of these took place in Gaul. The numerous, almost daily, notices of Gallican saints, with other indications of Gallican use, point to this. Probably this expansion of H.M. occurred at Auxerre, which, although a comparatively insignificant town, furnishes more festivals than any other, and has all its bishops noticed but one. The last bishop whose name is recorded is Aunacharius, and, as his 'natale,' *i.e.* entrance upon office (Prid. Kal. Aug.), only—and not his death—is commemorated, we may assume that the recension was made during his lifetime or shortly after (*c.* 592). All existing MSS of H.M. are derived from this Gallican edition. The Martyrology contains more than 8000 names of saints, large groups being allotted to each day. On June 2 the names of 220 saints appear. It frequently happens that the same martyr is commemorated on different days, in connexion with different places. This was a natural result of an uncritical combination of several calendars, when no care was taken to avoid repetitions. Transcriptional errors abound, in many cases rendering the entries unmeaning. We find often, as in the instance given above, names divided, or two names fused into one. 'Milia' is sometimes changed into 'milites.' The names of cemeteries are regarded as names of martyrs. So great is the confusion, that de Buck, the first critical reviewer of H.M., gives as his verdict: 'Nullus forte in universa antiquitate horribilior liber' (Prœmium to *Index Hagiologicus ad Acta SS. Supplementum*, Oct.). And the latest editors, de Rossi and Duchesne, in despair of emending the text, have simply printed the three chief MSS in parallel columns (their edition is prefixed to *Acta Sanctorum*, Nov., tom. ii., pars prior).

8. The later Martyrologies.—Martyrologies, called 'Menologies' by the Greeks, are distinguished from calendars in this, that they do not merely give the names and dates of saints, but add historical or legendary accounts of their martyrdoms. Occasionally in H.M. the entries of the deaths of martyrs are thus enlarged, but this feature became characteristic in the works which succeeded and were based upon it, and which are therefore properly termed Historical Martyrologies. The chief sources from which these accounts are derived are, in addition to H.M., the *Passions* and *Acts of the Martyrs*, the works of Eusebius, Rufinus, Jerome, Cyprian, Gregory the Great, the *Liber pontificalis*, etc.

The series of Historical Martyrologies commences with the *Martyrologium Romanum Parvum*,[1] composed at Rome about 700. It makes a rather sparing use of biographical matter, so that the *Passions* found in H.M. are often more diffuse. About the same time Bede drew up his Martyrology. He made large extracts from his authorities, and added several English and Frankish saints to the Roman list, and also, contrary to the Western usage, introduced some names from the OT, taking their dates from Greek Menologies. He left many days vacant, but these were filled up by later hands, so that it is impossible to decide how much of the Martyrology ascribed to Bede is actually his. Bede was followed by a line of successors, each of whom used the works of his predecessors, while availing himself of other materials. These subsequent writers were Florus of Lyons (*c.* 830); Wandelbert of Prum, who composed a metrical Martyrology (*c.* 848); Hrabanus Maurus (*c.* 850), whose work, in the opinion of Achelis, is independent of Bede; Ado, Bishop of Vienne (*c.* 870); Usuard, a monk of St. Germain-des-Prés, Paris (*c.* 875), whose book is practically an epitome of Ado's, and was the most used of all the Historical Martyrologies; and Notker Balbulus, a monk of St. Gall (*c.* 896). The *Martyrologium Romanum*, which was compiled by Baronius at the instance of Gregory XIII., is a revised and augmented edition of Usuard. It was prescribed for exclusive use in choir, at the canonical hours, by a Papal brief in 1584.

Achelis traces a twofold series of Martyrologies, starting from H.M.: a Roman-French line, viz. M.R.P., Ado, Usuard, and Baronius; and an Anglo-Saxon-German line, viz. Bede, Florus, Wandelbert, Hrabanus Maurus, and Notker. Dom Quentin does not make this distinction. He regards Bede as the source of all the later Martyrologies, and places M.R.P. late in the series, after 848.

The forementioned Martyrologies were written in Latin. A Martyrology in Anglo-Saxon, which is probably a translation made *c.* 850 from a Latin original of 750, has been edited by Herzfeld, London, 1900. Two others, in Irish, and including many Irish saints, have come down to us—the Martyrology of Oengus, of the date 804, composed in rhymed verse, and the Martyrology of Gorman, also metrical, written between 1166 and 1174 (both edited by Whitley Stokes for Henry Bradshaw Society, 1895 and 1905). The need for Historical Martyrologies arose from the practice of reading the *Passions of the Saints* during Divine Service. This custom is first mentioned by Aurelian, Bishop of Arles (545) (*Regula ad monachos*, Migne, *PL* lxviii. 396). It was the origin of the Lections subsequently inserted in the Breviary. The earlier practice was to read passages from Holy Scripture alone.

9. Later calendars.—We have seen that H.M. is essentially a collection of the calendars of local churches. Such calendars, in fact, could be in many cases reconstructed from the materials which it furnishes. But, apart from H.M. and the early calendars of which we have already treated, we do not meet with calendars proper until the 8th century. In the West, however, the lack of calendars is supplied by the liturgical books of the Roman and Gallican (*i.e.* non-Roman) rites, as in them provision is made for special Masses on Sundays and other days of observance, following the local festival lists. The books of the Greek Church do not help us here, as it has never been the Eastern custom to vary the Liturgy according to the day or season. In the Western Service-books the Sunday cycle appears for the first time, and thus an important feature is supplied, in which the early calendars and the Martyrologies, which, with rare exceptions, notice immovable feasts only, are lacking. At first the Saints' days were distributed through the whole year, but eventually, as their number continued to increase, they were placed together in a separate division of the Service-books, the *Proprium de sanctis*, apart from the cycle of Sunday services, the *Proprium de tempore*.

Belonging to the 7th cent., among books of the Gallican rite, we have the *Missale Gothicum*, which was apparently drawn up for the diocese of Autun; the Lectionary (*i.e.* book of Lections read in the Mass throughout the year) of Luxeuil, which probably represents the use of the church of Paris (Dom Morin, *Revue Bénédictine*, 1893, p. 433); and the Lectionary of Silos (ed. Morin, Bruges, 1893, under the title *Liber Comicus*),[1] which shows the festival list of the ancient ecclesiastical province of Toledo. To the 7th cent. also belongs the Gelasian Sacramentary, a Roman Service-book in use in France before the time of Charlemagne. The earlier Leonine Sacramentary, being a private collection of Masses, is an uncertain guide as to the calendar of its age.

Coming to the 8th cent., we have the Gregorian Sacramentary, containing the Roman liturgical services of the time, adapted for use in France (for the Roman Sacramentaries, see art. COLLECT). In it, with Alcuin's supplement, the Sunday cycle, as represented in the *Proprium de tempore* of the later missals, is almost complete. We have also the Calendar of Charlemagne (ed. Piper, Berlin, 1858)—a Roman calendar with many Frankish saints inserted. Of the same age is a Lectionary published by Fronteau in 1652, from a MS written in gold characters belonging to the Church of St. Geneviève, Paris. The East is represented in this century by Coptic calendars published by Selden (*de Synedriis*, iii. 15, London, 1650–55) from MSS which have since disappeared; and by the Menology of Constantinople, which gives a long list of the martyrs, confessors, and doctors of the Eastern Church, but only three martyrs of the West—Lawrence, Gervasius, and Protasius (ed. by Morcelli, Rome, 1788).

To the 9th cent. belongs the Sacramentary of Cologne, which contains a complete calendar—that of Rome, with the addition of the local saints of Cologne. The Sacramentary has been printed, but without the calendar, by Pamelius, *Liturgicon Eccles. Lat.*, tom. ii., Cologne, 1571. The 'Comes' of Ada at Trèves, with full festival list, is also of this cent. (ed. in *Die Trierer Ada-Handschrift*, Leipzig, 1889, pp. 16–27); so is the marble calendar of Naples, which is remarkable as containing several Eastern features; *e.g.* OT personages are admitted, the Council of Ephesus is commemorated (Aug. 4), also Constantine (May 21), Theodosius (Nov. 10), and a few Bishops of Constantinople (ed. Mai, *Nova Coll. Script. Vet.*, Rome, 1821). Another calendar of the 9th cent. is incorporated in a treatise *de Computo*

[1] Hereafter cited as M.R.P.

[1] From 'Comes'='Lectionarius,' *i.e.* the book which is the 'companion' of the priest in Divine worship.

by an unknown author (Migne, *PL* cxxix. 1274). It seems to belong to the diocese of Sens. The Leofric Missal (ed. Warren, Oxford, 1883) contains the calendar of Glastonbury, *c.* 970. At foot of p. xliv. the editor gives a list of English calendars in MSS of 9th to 11th centuries. The Bosworth Psalter (ed. Gasquet and Bishop, London, 1908), gives the calendar of Canterbury (between 988 and 1023) practically as it stood before Archbishop Lanfranc substituted for it the calendar of Winchester, the capital.

When Missals and Breviaries took the place of the earlier Sacramentaries, Lectionaries, etc., they were generally provided with calendars. A great number of these, and also of separate calendars, have survived, and many have been published. See for specimens Hampson, *Medii ævi Kalendarium*, vol. i., London, 1841.

With the exception of the Irish and Anglo-Saxon documents already referred to, vernacular calendars are hardly met with until towards the close of the Middle Ages. A calendar in French, of the 13th cent., is preserved in the Library of Paris. Another in Norman French of the 14th cent. (Harl. MSS. Cod. 273) is included in Hampson's collection (see above). Calendars in German also appear for the first time in the 14th century. The mediæval calendars, like those prefixed to modern missals and breviaries, and to the Book of Common Prayer, are 'perpetual,' *i.e.* not for any special year, but containing only the invariable elements common to all years, tables being generally provided by which the movable feasts for any particular year may be ascertained. The first printed calendars imitate the MSS in their arrangement, and, like them, are perpetual. Weale (*Analecta liturgica*, vol. i., Lille and Bruges, 1889) gives calendars of the 15th and early 16th cent. belonging to several continental dioceses. Heitz (*Hundert Kalender-Inkunabeln*, Strassburg, 1905) has reproduced in facsimile 100 calendars printed for popular use in Germany in the 16th century. They consist of single broadsheets, are mainly written in German, and mostly contain only a few dates, ecclesiastical and civil. The first calendar for a definite year was printed in German and Latin by John Regiomontanus at Nuremberg in 1475. It is arranged for the years 1475, 1494, and 1513, as the first years of a nineteen-year cycle, and so designed that the dates for other years can be calculated from it.

10. The Sunday cycle.—(1) *Western.*—All Sundays in the year, like the movable festivals, depend upon the date of Easter, with the exception of those connected with Advent and Christmas, *i.e.* those which occur from Nov. 27 to Jan. 6, both inclusive. The Sunday cycle begins with Advent Sunday, which is always the nearest Sunday to the Feast of St. Andrew (Nov. 30), either before or after. Three more Sundays in Advent follow; then two after Christmas, in case Advent Sunday falls on a day from Nov. 28 to Dec. 1, otherwise only one. Next come Sundays after Epiphany—from one to six, according to the position of Easter; Septuagesima; Sexagesima; Quinquagesima; six Sundays in Lent—the two last being generally known as Passion Sunday and Palm Sunday; Easter Day; five Sundays after Easter; Sunday after Ascension; Whitsunday; Trinity Sunday; and lastly, Sundays after Trinity—from twenty-two to twenty-seven, according as Easter falls later or earlier. The reckoning of Sundays after Trinity is that of the Church of England, and the one that appears in most English almanacs. The Church of Rome and the Greek Church number the Sundays after Pentecost (Whitsunday).

(2) *Eastern.*—In the East, all the Sundays except those immediately before and after Christmas Day, Epiphany, and the Exaltation, depend upon Easter. According to the calendar of Constantinople, with which the Russian and Georgian practically agree, the cycle of Sunday observance begins with the Sunday which in the West immediately precedes Septuagesima; *i.e.* it starts with the season preparatory to Easter. The Sundays usually take their names from the Gospel of the day. The 1st Sunday is called the Sunday of the Publican and the Pharisee (Lk 18^{10-14}). Then follow in order: the Sunday of the Prodigal Son (Lk 15^{11-32}); Abstinence Sunday, *κυριακὴ τῆς ἀπόκρεω* (the Western Sexagesima)—so called because it is the last day on which flesh is eaten, though the fast does not begin until the following week; Cheese-eating Sunday, *κυριακὴ τῆς τυροφάγου* (Quinquagesima)—thus named because cheese and butter are allowed to be eaten until the end of the day; 1st Sunday of the Fast, or of Orthodoxy (1st Sunday in Lent)—commemorating the conclusion of the iconoclastic controversy; 2nd, 3rd, 4th, 5th Sundays of the Fast; Palm Sunday [Holy and Great Monday, Tuesday, etc.]; Easter Day (*κ. τοῦ Πάσχα*), sometimes called Bright (*Λάμπρα*) Sunday [Monday, Tuesday, etc., of the Renewal (*Διακαινήσιμος*)]; Antipascha, or Sunday of St. Thomas (Jn 20^{19-31}); Sunday of the Ointment-Bearers (Mk 15^{43}–16^{8}); Sunday of the Paralytic (Jn 5^{1-15}); Sunday of the Samaritan Woman (Jn 4^{5-42}); Sunday of the Blind Man (Jn 9^{1-38}) [Ascension Thursday]; Sunday of the 318 Fathers of Nicæa; Holy Pentecost; and All Saints' Sunday (Trinity Sunday). The Sundays that follow are numbered after Pentecost, or are styled the Sundays of St. Matthew. Next come Sunday before the Exaltation, *i.e.* of the Holy Cross (Sept. 14); and Sunday after the Exaltation. The Sundays onwards, up to that which corresponds with the Western 2nd Sunday in Advent, are numbered after Pentecost, or are styled Sundays of St. Luke. Then follow: Sunday of the Holy Forefathers; Sunday before the Nativity of Christ; Sunday after the Nativity; Sunday before the Lights, *i.e.* Epiphany; and Sunday after the Lights. The remaining Sundays, up to the Sunday of the Publican, are reckoned after Pentecost, or are called Sundays of St. Luke.

11. The computation of Easter.—The primitive Christians all agreed in celebrating Christ's death and resurrection at the season when they actually occurred, that is, at the time of the Jewish Passover. They also agreed that the Crucifixion took place on a Friday which coincided with the 14th day of the first Jewish (lunar) month Nisan, the day on which the Paschal lamb was slain. But a division of opinion prevailed as to the days or day on which the death and resurrection should be commemorated. The Christians of Rome and of the West, claiming the authority of St. Peter and St. Paul, with many Eastern Churches, attached most importance to the days of the week, Friday and Sunday, on which these events happened. If 14th Nisan did not fall upon a Friday, they celebrated the death of Christ on the Friday following it, and the resurrection on the Sunday that succeeded, continuing their fast until the latter date. On the other hand, the Christians of Asia (proconsular) and of some neighbouring provinces, who traced their tradition back to St. John and St. Philip, insisted upon the observance of the day of the month on which our Lord suffered, hence receiving the name of 'Quartodecimans.' They always celebrated Christ's death on 14th Nisan, irrespective of the day of the week, and, ending their fast at 3 p.m. (the hour when our Lord expired), then began their Paschal feast, thus commemorating the death and resurrection on the same day. It is noteworthy that 'Pascha,' which subsequently came to mean the day of the resurrection, was employed, when first used as a Christian term, to designate the day of the passion (Tertullian, *adv. Jud.* 10; *de Bapt.* 19). The distinction of *πάσχα σταυρώσιμον*, Good Friday, from *πάσχα ἀναστάσιμον*, Easter Day, marks a transitional use of the word (Suicer, *Thes. eccl.* ii. 621 f., i. 304).

The first recorded occasion on which the two customs came into competition was the visit of Polycarp, Bishop of Smyrna, to Anicetus, Bishop of Rome (*c.* 158). It was then judged fitting that each party should abide by its own usage. The controversy was renewed in 198 by a later Bishop of Rome, Victor. At his instance, apparently, several Councils were held in the East and West, which decided against the Quartodecimans. These refused to give up their traditional usage, and found a champion in Polycrates, Bishop of Ephesus, who wrote a vigorous letter to Victor in defence of their position. Victor excommunicated the Quartodecimans, and endeavoured, but without success, to induce other Churches to do the same. Finally, mainly through the mediation of Irenæus, Bishop of Lyons, who, as a native of Asia and a Western bishop, was in touch with both parties, peace was restored, and the Asiatics were allowed to retain their usage until the Council of Nicæa (Eusebius, *HE* v. 23, 24).

As Christians made their Paschal anniversaries coincide in season with the Passover, so, for a long period, they were satisfied to accept the Jewish computation of the time of that festival, which should fall on the first full moon after the vernal equinox. But in the 3rd cent., owing to supposed errors in the Jewish calculation, which was based on a lunar cycle of 84 years, and also doubtless with the desire to be independent of the Jews, Christians began to frame lunar cycles for themselves. The earliest of such cycles extant is one drawn up at Rome by Hippolytus, about the year 222. This was a 16-year cycle, that is, it assumed that the new moons fell on the same days of the month at the end of every 16 years. So highly esteemed was Hippolytus for his work, that a statue of him, still in existence, was erected in Rome, with his cycle engraved on the sides. But the cycle proved faulty, and although emended in 243 by another calculator, the author of *de Pascha computus* (published as an appendix to St. Cyprian's works), it was not retained in use. In the beginning of the 4th cent. we find an 84-year cycle again employed at Rome (Ideler, ii. 238). At Antioch the computation according to the Jewish methods was maintained until the Council of Nicæa. It was at Alexandria that special study was given to the question, and from it ultimately came the ruling which found general acceptance. Dionysius, Bishop of Alexandria, in a Festal Epistle (*c.* 250) published the earliest Greek Paschal canon on record. It was calculated on an 8-year cycle, and it specified that Easter should not be celebrated until after the vernal equinox (Eusebius, *HE* vii. 20). Subsequently (*c.* 277) Anatolius, a native of Alexandria and afterwards Bishop of Laodicea, took the momentous step of making Meton's cycle (see below) of 19 years the basis of a new Paschal canon (*ib.* vii. 32). This was adopted at Alexandria, with the important change that the vernal equinox, which, according to Anatolius, fell on March 19, was assigned to March 21.

It should here be stated, for the sake of clearness, that the need for the employment of cycles for fixing the date of Easter arises from the fact that the conditions for determining it involve both the solar and the lunar year. As Easter day must be a Sunday, and one subsequent to the vernal equinox, the solar year is involved. As, again, Easter day bears a certain relation to the age of the moon, the lunar month and year become a necessary element in the calculation. The Metonic cycle was that upon which the determination of Easter was finally based. Meton, an Athenian astronomer, discovered (*c.* 433 B.C.) that in 19 solar years there are almost exactly 235 lunar synodic months, so that after the completion of every cycle of 19 years the new moons, and therefore all other phases of the moon, recur in the same order and on the same days of the month as they did at the beginning of the cycle. An error in the Metonic cycle was pointed out and corrected by Callippus of Cyzicus in 340 B.C. Meton calculated that 19 solar years contained 6940 days. He therefore assumed that the length of the solar year was $365\frac{5}{19}$ days, that is $\frac{1}{76}$ longer than $365\frac{1}{4}$ days—a more approximate length, as was afterwards ascertained, and later on adopted in the Julian calendar. This excess would amount to a whole day in 76 years. The Metonic cycle, therefore, would be a day wrong at the end of that time, and should be corrected by dropping a day. This was done by a rule introduced by Callippus that every fourth cycle should consist of 6939 days instead of 6940. Some 200 years later a further correction was made by Hipparchus. He found that the Callippic year of $365\frac{1}{4}$ days was about $\frac{1}{300}$ of a day too long, and therefore proposed to omit one day at the end of every 304th year.

The lack of uniformity as to the date of Easter caused many inconveniences, and exposed Christians to the derision of pagans (Epiphan. *Hær.* lxx. 14). In the West the 1st Council of Arles (314) attempted, but without success, to make the existing Roman use universal by decreeing 'ut Pascha Dominicum uno die et nno tempore per omnem orbem a nobis observetur' (Mansi, *Collect. Concil.* ii. 471). The Council of Nicæa (325), at the request of the Emperor Constantine, next took up the matter. Its deliberations, we know, resulted in the decision—involving the condemnation of the Quartodecimans—that Easter day should always be kept on a Sunday and never at the same time as the Jewish Passover (Socrates, *HE* i. 9; Euseb. *Vit. Const.* iii. 18), but what the Council further decreed on the subject is involved in doubt. St. Ambrose, in a letter written about 60 years afterwards, states that it resolved that the moon of the first month should be determined by the cycle of 19 years (Ambrose, *Oper.* ii. 880, *Epist.* 23). But in the extant records of the Council no trace of such a decree exists. The most probable solution of the difficulty is that the Council commissioned the Church of Alexandria, as most skilled in astronomical science, to frame a rule based on the 19-year cycle.[1] After the Council of Nicæa, the Paschal computation of Alexandria was generally accepted throughout the East, but the Roman Church retained its own rules of calculation; so that it frequently happened that Easter was celebrated on different days at Rome and Alexandria. At last, through the instrumentality of Dionysius, a Scythian and a Roman monk, the question was settled. The Alexandrian computation, as modified by him in 525, was adopted at Rome, and subsequently gained universal acceptance in West and East.

The countries which fell latest into line with the rest of the Church in the matter were the British Isles and Gaul. The British and Irish Christians had learnt to compute Easter according to the cycle of 84 years which had been in use at Rome in the beginning of the 4th cent., and they continued this practice unaffected by changes elsewhere. Not only was this cycle erroneous in its method, but it permitted the occurrence of Easter Sunday from 14th to 20th Nisan (Bede, *HE* ii. 2, 4, 19). As 16th Nisan is the earliest day on which Easter can fall, we may probably see here the result of a confusion between the earlier and the later meaning of *pascha* —that word, which in 300 meant Good Friday, had now come to mean Easter day. The bitter controversies on the Easter question which followed the arrival of the Roman St. Augustine in England were not settled until 747, when the Council of Cloveshoe decided in favour of the Roman usage. In Gaul a Paschal cycle of Victorius, Bishop of Aquitaine, drawn up at Rome in 457, which had been employed by Dionysius as the basis of his table, found such acceptance that it continued in use until the time of Charlemagne.

The conditions which were finally adopted for the determination of Easter are these: 1. It must be kept on a Sunday. 2. (*a*) This Sunday must be the next after the 14th day of the Paschal moon reckoned from the day of the new moon inclusive. (*b*) If the 14th day should happen to be Sunday, Easter must not be kept until the following Sunday. 3. The Paschal moon is the calendar moon whose 14th day falls on, or follows next after, the day of the vernal equinox. 4. The 21st March is to be taken as the invariable day of the vernal equinox. The object of the second rule is to prevent Easter from being kept either *before*

[1] Cyril of Alexandria ('Prologus paschalis,' ed. Patavius, *de Doctrina Temporum*, Paris, 1627, ii. Append. p. 881), claims for his Church such a synodical commission to calculate Easter, but does not mention the Council which conferred it.

the day of the Jewish Passover—which would put the Resurrection day before the day of the Passion ; or *on* the Passover day—a coincidence which Christian prejudice regarded as intolerable. The following brief summary of these conditions is given in the chapter 'De anno et ejus partibus' prefixed to the Roman Missal and Breviary :

'Ex decreto sacri Concilii Nicaeni Pascha, ex quo reliqua Festa mobilia pendent, celebrari debet die Dominico, qui proxime succedit xiv Lunae primi mensis ; is vero apud Hebraeos vocatur primus mensis, cujus xiv Luna vel cadit in diem verni aequinoctii, quod die 21 mensis Martii contingit, vel propius ipsum sequitur.'

It is important to bear in mind that, as stated in rule 3 above, the moon[1] by which Easter day is calculated is the calendar moon or moon of the lunar cycle, and not the actual moon of the heavens. The real motions of the sun and moon, being variable, have not been employed by the Church for the fixing of her festivals. Similarly the vernal equinox in rule 4 is not the true but the calendar equinox. The true equinox obviously cannot be fixed to a single day, because, in consequence of the intercalary day every fourth year, it must necessarily oscillate between two days (Clavius, v. §§ 12, 13).

The Dionysian Easter canon had been generally accepted throughout Christendom ; but it suffered from two defects which in process of time compelled attention. (*a*) Taking for its basis the Julian calendar (see CALENDAR [Roman]), it assumed that the solar year consisted of exactly 365¼ days. But the solar year falls short of the Julian estimate by somewhat more than 11 minutes, and this error would accumulate to one day in about 128½ years. (*b*) It further assumed that 235 lunar months are exactly equal to 19 Julian years, whereas they are nearly 1½ hours shorter—a difference which would accumulate to one day in 308 years. Notice was directed to the matter at the beginning of the 13th cent. in the *Computus* of Conrad, and later on by an anonymous writer, generally supposed to be Vincentius of Beauvais. A treatise of Roger Bacon, 'De reformatione calendæ,' which was addressed by him to Pope Clement IV., is still in MS at Rome. In the East also, Isaac Argyrus, a Greek monk, contributed (1372) an essay on the subject (criticized in Petavius' *Uranologion*, Paris, 1630, lib. viii.). In the 15th century the matter was brought before the Council of Constance (1414) by Cardinal Peter D'Ailly and before that of Basel (1436) by Cardinal Cusanus. It was again mooted at the Lateran Council under Leo X. Finally, the Council of Trent delegated the revision of the calendar to the Pope, and Gregory XIII. carried it out in 1582. The Papal commission appointed for this purpose worked upon proposals made by Luigi Lilio, a Calabrian astronomer. The commission was presided over by a distinguished mathematician, Christopher Schlüssel, who is better known by his Latinized name Clavius. To him the reformed calendar is mainly due.[2] For these earlier suggestions about revision see the 'Proœmium' to Clavius's work, and Ideler, ii. 300 ff.

At the time that the Gregorian revision was set on foot, the error arising from the undue length of the Julian year amounted to nearly 10 days. The true equinox, therefore, had receded nearly 10 days from the calendar equinox, March 21. The error also of the lunar cycle had grown to more than 4 days, so that what was accounted the 14th day of the moon was really the 18th day. Different methods were suggested for getting rid of this accumulation of errors. That which was adopted by Gregory's mathematicians was to drop 10 days at once out of the calendar, and thus to restore the equinox to March 21, the day on which it fell about the time of the Nicene Council. It was accordingly ordered in the Pope's Bull that the 4th October, the Feast of St. Francis, 1582, should be immediately followed by the 15th, 10 days being thus omitted from the calendar. As regarded the rectification of the lunar cycle, it was decreed that the new moon should be drawn back 3 days. Consequently in the first rectified year of the cycle, the first new moon was removed from Jan. 3 to Dec. 31 preceding. To prevent the recurrence of similar confusion, rules were made that 3 bissextile days should be omitted every 400 years, and that the new moon should be carried back 1 day 8 times in 25 centuries, beginning from 1800.

The Gregorian calendar, or 'New Style,' was almost immediately adopted by Roman Catholic nations. In Germany the Emperor Rudolf II. and the Roman Catholic States accepted it in 1583, but the Elector of Saxony and the Protestant States adhered to the Old Style, objecting to the New, not merely as coming from Rome, but because of certain defects which Scaliger and other authorities pointed out in its astronomical accuracy. This difference of calendar was productive of much dissension and inconvenience, especially in places where populations were mixed. In 1700, at the instance of Leibniz, the Protestant States agreed to omit 11 days from their calendar, and so far conformed to the Gregorian revision. But, instead of following the rule that Easter should depend on the 14th day of the calendar moon, they determined it by the true astronomical full moon. Thus it still happened that in some years Easter was kept on different days by the two parties, and much confusion resulted. At last, in 1775, on the proposal of Frederick the Great, the Corpus Evangelicorum resolved to accept frankly the Reformed Calendar, thus producing uniformity of practice in Germany. In England the change was made in 1752, in pursuance of an Act of Parliament passed the year before, which enacted that the day next following the 2nd September 1752 should be called and reckoned the 14th September, the 11 intermediate days of the common calendar being omitted ; and that the centennial years 1800, 1900, etc., should be common years, with the exception of every 400th year, beginning with 2000, which should be regarded as leap-years ; also that for the future Easter day and the movable feasts depending upon it should be celebrated according to new tables and rules which, with a new calendar, were annexed to the Act, and which were directed to be substituted for the existing calendar, etc., in the Book of Common Prayer. The new tables and rules were prepared by the then Astronomer Royal, Dr. Bradley. All Eastern Christians, including Greeks and Russians, with the exception of the Romanized Uniats, still adhere to the Old Style. At present their reckoning is 12 days behind that of the rest of the civilized world.

12. **Calendar letters.**—In the Julian (pagan) calendar, days of the year were arranged in successive groups of 8, called *nundinæ*, with the letters A–H attached to them. This suggested to Western Christians—for the plan was never adopted by the Easterns—the marking of the days of the week in the Christian calendar with the 7 letters A–G, repeated throughout the year. These 'calendar *or* ferial letters,' as they are called, were, as has been noticed above, introduced probably at the time when the Christian Sunday was legalized by Constantine. We have seen that they occur in the pagan calendar of Filocalus side by side with the *nundinæ*. The Sunday, or Dominical, letter of each year is that

[1] Church chronologers were in the habit of giving the name 'Full Moon' to the 14th day of the calendar moon (Ideler, ii. 198). In the definition of Easter in the Book of Common Prayer, 'Full Moon' is used in this sense.

[2] Clavius, in a work (*Romani Calend. explicatio*) published at Rome in 1603, gave an exhaustive account of the whole subject.

which stands opposite the first (and every successive) Sunday in the year; and, when it is known, the week day of any day in that year can be ascertained. The 29th Feb., which occurs only in leap year, has no letter in the regular sequence affixed to it; it takes the letter of March 1, which therefore occurs twice. This has the effect of changing the Sunday letter for the rest of the year. A leap-year, therefore, has two Sunday letters; the first applicable to January and February; the second, which in the order of the letters of the alphabet is always one behind the first, to March and the remaining months. The Roman Catholic calendar still follows the Julian in placing the intercalary day between the 23rd and 24th Feb., thus making two 24ths, as in the Julian calendar there were two VI. Kalend. Hence the change in the Sunday letter takes place in the Roman calendar after Feb. 24. The English Church calendar retained the ancient practice until 1662.

13. Golden numbers and epacts.—The designation 'golden numbers' was given in the Middle Ages to the numerals in the calendar which denoted the 19 years of the Metonic lunar cycle (see above), either as an expression of the great value attached to them or as having been rubricated. These numbers were formerly marked throughout the year in the first column of the calendar, being affixed to the days of the occurrence of the new moons in each year of the cycle. But since 1752 they indicate in the Prayer Book the days upon which the full moons of the respective years fall, and they are inserted in the calendar only from March 22 to April 18, the Paschal full moon limits. Easter day itself occurs at earliest on March 22, and at latest on April 25. In the Roman calendar, since the Gregorian reformation, 'epacts,' which represent the number of days of the moon's age at the beginning of each year in the 19-year cycle, have taken the place of the 'golden numbers' in the first column.

14. Christian era.—As the Christian calendar was based, as regards its form and divisions, on the official (Julian) calendar of the Roman Empire, so during the earlier centuries Christians employed the eras used by their pagan countrymen. About the year 532, Dionysius, whose part in framing the Easter canon has been mentioned, proposed that the epoch of the birth of Christ, which he assigned to Dec. 25 A.U.C. 753, should be adopted by Christians. This was called the Vulgar or Dionysian Era, and gradually gained almost general acceptance. Dionysius did not make the epoch commence on the day of the Nativity, Dec. 25, but on Jan. 1 in the following year A.U.C. 754. Thus A.D. 1 is not the year of the Nativity, but the first current year after it. It is well known that Dionysius was incorrect in his calculation, and that the birth of Christ should more probably be assigned to A.U.C. 749 or B.C. 4.

15. Commencement of the year.—The acceptance by the Church of the framework of the Julian calendar involved the placing of Jan. 1 at the beginning of the Christian calendar. But, besides this New Year's Day, to which the calendar bore witness, other beginnings of the year, of more purely ecclesiastical origin, have been observed in Christendom. The chief of these are the following: (1) March 1, kept in Merovingian France, among the Lombards, in the Republic of Venice, and for a long time in Russia; (2) Easter, observed chiefly in France, and hence called *Mos Gallicus*; (3) Sept. 1, according to the custom of the Greek and Russian Churches; (4) Christmas Day—the usage in England in Anglo-Saxon times, also in Scandinavia, Prussia, Hungary, Switzerland, etc., in early times; (5) March 25, the Annunciation B.V.M., used first in the North of Italy, whence it passed into France and Germany. It was adopted in England as a Church reckoning in the 12th cent. —superseding Jan. 1, which had been the beginning of the year since 1066—and in the 14th came into civil use. This continued to be the legal and ecclesiastical usage until the revision of the calendar in 1751. It was then enacted

'that the supputation according to which the year of our Lord beginneth on the 25th day of March shall not be made use of from and after the last day of December 1751; and that the 1st day of January next following . . . shall be reckoned . . . to be the first day of the year 1752.'

It should, however, be noted that, although in the successive editions of the English Prayer Book from 1559 to 1662 it is stated that the year of our Lord begins on March 25, yet the expression New Year's Day is applied, in the rubric following the collect for St. Stephen's day, to Jan. 1. It is also to be observed that from 1549 onwards the series of daily lessons are arranged in the calendar with reference to Jan. 1. Thus both usages, the legal-ecclesiastical and the calendar, are recognized. While this double commencement of the year prevailed, it was customary, in giving the date of an event between Jan. 1 and March 25, to write both years—the legal first, the calendar afterwards: thus 20 Feb. 1721-2. A somewhat similar practice came into use, and was kept up for many years, after the introduction of the New Style, namely, that of writing the two dates in the form of a fraction, the old above, and the new below the line, thus $\frac{1}{12}$ May 1760.

Yet another arrangement of the year is that connected with the cycle of church services. The Latin and English Churches in the West, and the Nestorian in the East, commence their ritual year on Advent Sunday, or, as the Nestorians name it, the first Sunday of the Annunciation. The Armenians begin theirs on Epiphany, Jan. 6. The Constantinopolitan rite, with the Russian and Georgian, makes, as we have seen, the starting-point of its round of movable festivals the Sunday of the Pharisee and Publican, which coincides with the Western Sunday before Septuagesima. See also FESTIVALS AND FASTS (Christian).

LITERATURE.—For the early calendars and Martyrologies: de Rossi-Duchesne, *Martyrologium Hieronymianum*, prefixed to Bollandus, *Acta Sanctorum*, Nov., tom. ii., pars prior; Achelis, *Die Martyrologien, ihre Gesch. und ihr Werth*, Berlin, 1900; Quentin, *Les Martyrologies historiques du moyen-âge*, Paris, 1908; Piper, *Die Kalendarien und Martyrologien der Angelsachsen*, Berlin, 1862; Krusch, *Der 84jährige Ostercyclus*, Leipzig, 1880; Hefele, *Conciliengesch.*, Freiburg, 1855, Eng. tr., Edinburgh, 1871, i. 298 ff. For structure of the calendar and computation of Easter: Ideler, *Handbuch der Chronol.*, Berlin, 1825; Bingham, *Origines Eccles.*, bk. xx. ch. v.; Butcher, *The Ecclesiastical Calendar*, London, 1877; Salmon, *Introd. to the NT*, London, 1889, p. 262 ff.; Hennessy-MacCarthy, *Annals of Ulster*, Dublin, 1887-1901, vol. iv., Introd. For Eastern calendars: Allatius, 'Dissert. de dominicis Græcorum,' in *De Eccl. occid. et orient. Consensione*, Cologne, 1648; Nilles, *Kalendarium manuale utriusque ecclesiæ orient. et occident.*, Innsbruck, 1896; Neale, *History of the Holy Eastern Church*, London, 1850, and *Liturgiology*, London, 1863; Michell, *An Egyptian Calendar for the Koptic Year 1617*, London, 1900; Martinov, 'Annus ecclesiasticus Græco-Slavicus,' in Boll. *Acta SS.*, Oct., tom. xi. pp. 1-385; Donici, *Orientalischer Kirchenkalender*, Bucharest, 1903. For Eras: De Vaines, *Dictionnaire raisonné de Diplomatique*, Paris, 1774, vol. i. p. 320 ff. In general: Duchesne, *Origines du culte chrétien*[3], Paris, 1898 (Eng. tr. by McClure entitled *Christian Worship*, London, 1903); Kellner, *Heortologie*, 1901 (Eng. tr., London, 1908); Wordsworth, *The Ministry of Grace*, London, 1901; Bond, *Handy-Book for verifying Dates*[4], London, 1889; artt. in *PRE*[3], *Schaff-Herzog Encyc.*, *Catholic Encyc.*, etc. Other authorities are referred to in the article.

JAMES G. CARLETON.

CALENDAR (Egyptian).—I. *INTRODUCTION.*—The calendar is always one of the most important elements in a society, for it denotes civilization. It is especially so in Egypt, where it explains a large part of the religion, and gave rise to some of the mythology. It is not only the fundamental basis of worship, but it is probably the element which has had the greatest influence on

the evolution of religious ideas, and, consequently, on the organization of ethics. The Egyptian calendar is also one of those for which we have the richest collections of information and documents. It may therefore be considered from two points of view: (1) by examining it with regard to its absolute divisions, its improvements, and its application to chronology; or (2) by studying the conception which gave rise to it, its original characteristics, and the very large part it played in connexion with religion. In the present state of science, everything seems to have been said and written from the first point of view.

II. *Documents.*—These are particularly abundant, and, fortunately, they extend from Memphite times to the Roman period. We may note the following as real calendars in chronological order: (1) the Palermo Stone (Vth dynasty, copied partly from documents of great antiquity), (2) the Kahun Papyrus (XIIth dynasty), (3) portions of the calendar of Thothmes III. at Karnak (XVIIIth dynasty), (4) portions of the same king's calendar at Elephantine, (5) calendar of Medinet-Habu (XIXth dynasty), (6) calendar of Sallier Papyrus (XIXth dynasty, cf. British Museum Papyrus 10,174), (7) calendar of Edfu (Ptolemaic age), (8) that of Ombos (same period), (9) that of Denderah (Roman period), (10) that of Esnèh (same period), (11) that of the Leyden Papyrus (same period).

Further, the tombs and stelæ from the end of the IIIrd dynasty to the close of the classical period present thousands of *funerary calendars*, sometimes with long lists of dates, anniversaries, and commentaries. We have them also for all the historical periods, and scattered throughout all the provinces (cf. below, § IX.).

Lastly, in addition to calendars properly so called, we may mention: (1) the series of calendric anniversaries quoted in all the Books of the Dead (even the very earliest known specimens), on papyri, and on the inner sides of coffins, and evidently copied from pre-historic versions; (2) the innumerable references in the texts in general, from the famous Texts of the Pyramids to the papyri, as well as the inscriptions in the temples, the accounts of historians, the texts connected with local festivals, the references on stelæ, tombs, etc.—the whole from the Memphite to the Roman period (for the chief bibliography on these documents, see § XVIII. of lit. at end of art.).

There is good reason for believing that the 'ancient plaquettes' of the monuments of the earliest dynasties are fragments of a calendar of the Thinite and pre-Thinite epoch, and therefore the oldest in the world, and also that the vases of the Neggadeh period reproduce still older calendric indications. On this hypothesis, which has not yet been formulated, see below, § IX., in connexion with the notation of time on the Palermo Stone and on the 'plaquettes.'

III. *Divisions of Time.*—Egypt was never acquainted with anything like an era, referring to a cosmogonic date, such as the Creation, to a noteworthy meteorological event, to an imaginary episode, or to a legendary or historical fact. With the exception of the stele of Sân, dated the 400th year of an ancient king, Egypt never had any idea of dating her annals except by the years of rule of the reigning Pharaoh (see below, § VI.). Nor did she try to imagine periods and cycles; all that modern science has from time to time thought to discover in this sphere regarding so-called divisions of time has always been disproved by a more careful study of the texts. The Sothic period and the Sothic half-period (see below) were not invented until the time of the Antonines. The supposed *Sadu* period does not at all correspond to a cycle of thirty years, but to royal jubilees with variable anniversaries, not based on the ordinary calendar (except under the Ptolemys = *triakontaeteris*), but perhaps on facts of astrological character; the *hunti* (simple or double) has in modern times been translated sometimes by 'cycle of 60 (and 120) years,' sometimes by 'millions of years' (de Rougé, *Chrestomathie*, ii. 129)—which clearly shows the absence of ancient texts. As a matter of fact, the *hunti* forms part of the group of vague terms by means of which the language tried to express 'great length,' and which may be translated, more or less inexactly, 'many years,' 'innumerable years,' 'as long as the existence of the sun,' 'indefinite length of time' (but *not* 'infinite'), etc. The Egyptian did not even know the century, or the fraction of the century. The four year cycle of Brugsch is no longer taken seriously; Borchardt's hypothesis (*Verhandl. Orient. Congr.*, 1902, p. 329) of a *census* cycle of fourteen years, under the first Thebans, is ingenious but nothing more; and if Breasted has noted that the moon occupied the same place in the calendar every nineteen years, no text shows that the Egyptians turned this to account in order to form a calendric division. These modern attempts seem destined to the same failure as the hypothesis of the 'period of the Phœnix'—a rubric which no longer figures in Egyptological publications (cf. Naville, *Festival-hall*, p. 7). And the year (*ronpit*), with its divisions, remains positively the only certain measure by which Egypt reckoned time.

The year began—in theory at least—on 19th July, and the 365 days of which it was composed were divided into three seasons (*tetramenies*) of four months, each month containing thirty days. The five complementary or epagomenal (cf. below) days, placed at the end of the twelfth month, form a sort of distinct period, intercalated between the 'small year' (360 days) and the 'large year' (365 days). The uniform months (*abudu*) were divided into three periods of ten days.[1] They were known as that of the beginning (*hati*), that of the middle (*abi*), and that of the end (*pahu*)—and this at least as early as the Xth dynasty (cf. Daressy, *Décans*, etc.). The day itself (*haru*), divided into twelve hours (*uônuit*) of daytime and twelve of night, obeyed the demands of tripartite and quadripartite symmetry of the whole system by dividing its hours of day and hours of night into three periods (*tôri*) of four hours each. There is no ground for saying that the subdivisions of the hour into minutes (*at*) and seconds (*hât*) were known in the Pharaonic period. Lepsius (*Chronol.*) has shown that they are far more probably the work of scholars of the Ptolemaic age. The division of the second into 'thirds' (*anit*) is a modern invention of Egyptologists who took the words 'twinkling of an eye' literally for the measurement of an exact space of time. But even in the latest times the Egyptians were not aware of the existence of such a fraction.

The division of the day into three parts, marked by sunrise, midday, and sunset, is uncertain. The fact, often mentioned, of offerings of resin, myrrh, and incense, made to the sun of Heliopolis at these three moments of the day, is reported by Plutarch (*de Isid.* 80). Probably this simply indicates a local sacerdotal custom, and not an absolute division of time.

The names of the three seasons, *shaït*, *pirit*, and *shômu*, refer roughly to the appearances of the valley of the Nile during the year, and to the cycle of irrigation. The first alone corresponds more or less exactly to the four months of *inundation*. The second and third are of artificially symmetrical composition; the second (*pirit*) may resemble in some measure the four months of the *growing of the crops* in Upper Egypt (the end of November to the end of March). The third (*shômu*) is clearly artificial. It is usually translated 'season of harvest'—a reading which is simply inferred by deductive reasoning, for neither the word nor the

[1] Daressy recently contended (in *Annales du Service des ant. de l'Egypte*, 1909) that they were formerly divided into four weeks of seven days; but there is no sufficient evidence for this.

sign refers positively in Egyptian to any such concept as the primitive meaning, and it is by inference that the meanings 'harvest' and 'products of the soil' have come from the sign for the season. Originally it probably designated works of irrigation preceding the rising of the waters (cleansing of canals, etc.).

The *names of the months* do not seem to have been in use in the earliest times. At least the official inscriptions never mention them. They say: first, second, third, fourth month of such and such a season. It seems probable that, at an uncertain date, popular custom gave currency to the use of nomenclature denoting the months by the characteristic religious episode which was commemorated in them. Some of these are cited by the classical writers. The fact that they are exactly those which the Copts use for the corresponding months gives reason for thinking that the same thing is the case with those which they do not cite, and science has adopted the habit of giving the names of the twelve Coptic months to the Egyptian months. They are, for the first season, *Thot, Paophi, Athyr, Choïak*; for the second, *Tybi, Meshir, Phamenot, Pharmuti*; and for the third, *Pakhon, Payni, Epiphi, Mesorî*.

IV. *History.*—1. From earliest known origins to the year 238 B.C.—As it has just been described in its simplicity and relative perfection, the Egyptian calendar appears throughout the whole of its history. However far back we may trace it, we cannot reach the moment of a change in it—any more than we can show an authentic improvement during the series of centuries down to Ptolemy Euergetes I. It has been said that the year was at first a lunar one of 354 days, in which the dates were given by the days of the moon, and that there are clear traces of it, for example, in the manner of writing the month by the sign of the crescent, or in the fact that the reign of Osiris had lasted twenty-eight years, which, says Plutarch (*de Isid.* 42), corresponds with the days of the lunar month. This is extremely plausible, because almost all the calendars known in the world began in this way, and because the movement of the moon was the only noteworthy division perceptible to man in his early efforts. This is proved clearly enough by the etymology of the word 'month' in the principal Aryan languages—to speak only of the calendars of our races. But, so far as Egypt is concerned, it is a mere assumption, for there are no real traces of it, and it is not right to say, as many writers have done, that 'the lunar year preceded the solar year, in Egypt as in India.' It has also been contended that there was a year of 360 days, traces of which are preserved in the religion; *e.g.* in the fact, quoted by Diodorus (i. 22), of the 360 cups of milk on the tomb of Osiris at Philæ. This is confusing a demand for symmetry—which is really a mark of civilization—with initial gropings. The year of 360 days is a year of administration, and of sacerdotal accounting, which we find in use in the height of the historical period, parallel with that of 365 days, and which naturally was completed by the five epagomenal days (cf. the calendar of Medinet-Habu or the 'contracts of Syut'); hence the terms 'small' and 'large' year used to denote the temple year and the ordinary year respectively. The efforts of all races show, on the contrary, that even comparatively civilized peoples, like those of Benin or the Bavili, have never passed from the lunar year to the year of 360 days, with months of 30 days, but have, as a rule, compensated for the error between the number of lunar months (12 lunations = 354·367 days) and the apparent revolution of the solar year by introducing after the twelve lunar months a complementary month of some days, often qualified by the name 'season.' The most probable supposition, then, if we want a hypothetical history of the Egyptian calendar, is that the lunar year (or the 13 sidereal months) was originally followed by an epagomenal month. The use of the numeration by ten, and especially the need for practical symmetrical divisions, naturally led (but undoubtedly much later) to the creation of the month of 30 days, which, owing to its artificial character, corresponding neither to the sun nor to the moon, denotes a distinct step in advance. The fraction remaining to be harmonized was thus reduced to the five epagomenal days.

We find these epagomenal days in the very earliest mentions of the calendar. The first Egyptologists for a long time believed that the invention did not go further back than the XIIth dynasty. It is now proved that these five days over and above the year (*haru duaït hiru ronpit*) existed not only under the Memphite Empire but long before, since mention is made of them in the Texts of the Pyramids (Pepi 2, line 754). This, to all appearance, carries them back to the pre-historic period, and it is quite incorrect to ascribe the 'invention of the year of 365 days' to the year 4241 (Breasted, *Ancient Records*, p. 40). That is merely the earliest date postulated by those scholars who believe in the Sothic period (cf. below), but there is nothing to prove that these epagomenal days are not as old as Egypt itself. The legend of their invention by Thoth playing chess with the moon was long believed to be of comparatively recent date, on account of the Greek form which Plutarch (*de Isid.* 12) gives to it. But the Leyden Papyrus (i. 346) has shown that the legend existed in its essential features in the time of the Thebans, and the Texts of the Pyramids have carried it back to the very beginnings of Egyptian mythology. These five days preserve a further sign of their extreme antiquity in their designation 'little month,' which brings them peculiarly near to the 'short month' of the Bavili and the 'supplementary month' of Benin, and which was kept until the time of the Coptic calendar.

These ἐπαγόμεναι ἡμέραι were regarded under the Ptolemys as a complement of the year. The Leyden Papyrus presents a theory which is probably different. These days are really 'in addition to the year,' but religiously (and especially from the point of view of the dead, and of astrological influences on the living) they seem to be a sort of 'preface' to the new year. They form a period quite apart, which has its special calendar, its names (cf. Chabas, *Œuvres*, iv. 207), its horoscopes, its gods, and its spirits. If the whole is referred to the old tables of funerary calendars, the result seems to be that the 'year' ended with the last day of the twelfth month. The first of the epagomenal days, therefore, marked the 'opening of the year,' and the *beginning* of the year (*tap ronpit*) was the first day of the first month of the new year (cf. the five Mexican epagomenal days, which are called *nemontemi* = 'useless,' or 'unfit for work').

This calendar has justly been cited with admiration, and classed with those which mark most clearly the height reached by ancient civilizations; and Breasted (*Ancient Records*, p. 25) was right in pointing out the immense advance it was for humanity. It is sufficient to recall what were, down to a very late date, the best Hellenic calendars, and the testimony of Strabo (xvii.) on this point, or to think of what the Roman calendar was down to the end of the Republic. All the classical writers, from Herodotus onwards, were only performing an act of justice when they spoke of the Egyptian system in a tone of respect. If ancient Egypt knew nothing about the learned and manifold complications of the Indian cycles (length of

ancient Indian year = 13 sidereal months or 355·1823 days), the needs of absolute chronology may deplore the fact, but the historian can point out the superiority of this simple system, which harmonizes practical and symmetrical divisions so skilfully with real time. The whole world, from the time of the earliest civilizations, has proved the impossibility of adjusting to the course of the moon a notation of time suitable for human activity. And it was probably in this that the first superiority of the Egyptians consisted. If they did not know, as it seems, the famous period of 223 lunations recognized by the Babylonians, their 12 months of 30 days, followed by five days, were far superior to the lunar year of Chaldæa, with its very imperfect remedy supplied by the 'second month of *Adar*,' or the 'second *Elul*,' or the 'second *Nisan*,' added every six years; and far superior also to the 18 months of 20 days each of the Mexican calendar, with its five *nemontemi*. Undoubtedly, non-civilized races, like the Kikuyu, have also discovered the month of thirty days, but their double period of six months is what really accounts for this. If Egypt had kept to the lunar month, she would have experienced all the inconveniences of those peoples who have persisted in making use of it. The 'seasons,' to which it is customary to point as one of the merits of the Egyptian calendar, have been discovered in Africa by societies far less advanced. The 8 months' season and the 4 months' season of the Bavili correspond, as a matter of fact, to the 3 Egyptian *tetramenies*, and Benin possesses the 3 *tetramenies*. The great difference is that the Egyptians reduced the 'thirteenth month' to five days, by the adoption of the month of 30 days. At the same time Egypt made the very useful subdivision of the month into decades, instead of having recourse, like her sister nations of Africa, to the unsymmetrical week of 8 days, or to that of 4, or to the artifices of pastoral peoples like the Basutos. They might also, like ourselves, have absorbed the 365 days in their twelve months, by accepting the inconvenience of months of 31 days. Would any one dare to assert that their months, all symmetrical, are not better? And have we not heard it proposed in our day to place the five supplementary days apart at the end of the year, without the authors of these propositions having any idea that they were simply asking for a return to the calendar of the ancient Egyptians?

2. From Ptolemy Euergetes I. to the end of Egyptian civilization.—The system, nevertheless, presented two defects of very unequal importance: (1) the hours had only an approximate value, variable throughout the year; and (2) the year itself was shorter than the real solar year by 5 h. 48 m. 57 s. (length of the tropical year in 3000 B.C. = 365·24249916 days).

(1) The former of these faults proceeded from the basis on which the hour was introduced. The majority of African races had the same idea as the Egyptians: to divide the day into the same number of equal fractions as the year is divided into (excluding the 13th month). This was to obtain the division by twelve. It may be preserved, with a rough approximation, if the division is applied, as it is in the Upper Congo, to the space of time between one sunrise and another. In making special divisions for the day and for the night, the Egyptians encountered serious difficulties. As the first hour of the day began at dawn, and the twelfth ended with sunset, the length of each hour naturally varied according to the season. For a long time the Babylonians had the 12 equal fractions of the day, *τὰ δυώδεκα μέρεα τῆς ἡμέρης* (Herod. ii. 109)—undoubtedly owing to the regular divisions which the use of the *πόλος* had taught them to draw on the line described by the shadow of the pin of the sun-dial. It was not, however, until Asia had taught the Greeks the use of the two series of twelve similar hours, and the Ptolemys had come to Egypt, that this advance was realized. We saw above (p. 92[b]) that it was at this same time that the minutes were instituted, from the same Asiatic source.

(2) The second defect of the system was more serious. It had affected all calendars, including the Chaldæan, and still affects that of many systems in vogue at the present day. The quarter of a day, which the year of the Egyptian calendar neglected, in the long run produced errors which were manifestly intolerable, and it does not seem ever to have occurred to the Egyptians to adopt such a simple but clever correction as that of the Mexican *tonalpouhque* ('sun's examiners'), who added 13 complementary days after a cycle of 52 years. Authentic examples, taken from texts and cited by all Egyptologists, prove that the discrepancy might reach several months; and papyri have bequeathed to us complaints by the employees of the administration on the matter. The date of the low Nile in the inscription of Uni (VIth dynasty), the Ebers Papyrus under Amenhotep I. (XVIIIth dynasty), a date of the heliacal rising of Sothis under Thotmes III. (XVIIIth dynasty), and the date of the rising of the waters under Shabataka (XXVth dynasty) are four good examples of divergence between the calendar and the astronomical truth. The practical necessities of worship and of economic life could not put up with these discrepancies, which went so far beyond the limits of the reasonable. From time to time an administrative measure cut off, or added, the necessary number of days, and made the calendar year and the solar year start on the same day. Then things once more went on getting worse until the day when the too evident inconveniences made the government again have reconrse to the forcible regularization of the two years, the real and the calendric. It had undoubtedly taken place shortly before the time of Herodotus, for he speaks (ii. 4) of the year of 365 days as a perfect instrument, agreeing with the seasons.

Nothing definite is known concerning these manipulations. Only it is probable that the further we descend in history the less frequent they were, because in the earliest times the direct observation of the sky and of Nature was more the basis of the calendar, and would thus speedily note the error. The increasing power exerted by what was *written*, as is always the case, must have resulted in a longer continued observance of the official calendar, in spite of the contradictions offered by the stars and the seasons; hence the paradoxical result that the discrepancies were more prolonged in proportion as the centuries of civilization increased in number. It is certain, in any case, that one of the largest discrepancies that we know is precisely the latest in date—that which existed at the time of the reform of the year 238 B.C. The heliacal rising of Sothis took place in that year on 1st Payni—an error of *ten months*.

This way of setting right the discrepancy by sudden leaps seemed intolerable to the astronomers, steeped in Asiatic science improved in Greece, who devoted their attention under the Ptolemys to the defects of the Egyptian year. Their calculations led them to the discovery that it was necessary to increase the duration of the year by about six hours. The easiest solution was to group these six hours in a supplementary day every four years, and, as a result, the world had the 'leap-year' introduced by the celebrated *Decree of Canopus* in the year IX, 17 Tybi of the reign of Ptolemy III. Euergetes I. (7th March 238). The fact that the definitely fixed year contained the mention of the appearance of the star Sothis, and that the heliacal rising of this star took place on the 19–20th of July, later on led the contemporaries of the Antonines to infer that the Egyptians had possessed, at least in the science of the temples, the knowledge of a perfect cycle in connexion with the

heliacal rising of this star. Noting the annual difference between the ancient calendric year of 365 days and the date of the appearance of Sothis exactly at sunrise, they were easily able to calculate that, after 1460 astronomical years, exact agreement would be re-established, so that these 1460 years were equal to 1461 years of 365 days. They imagined then that the priests had noticed the equation, and they therefore created the famous 'Sothic period,' which they affirmed had been known and used from the most ancient times by the national chronology. Egypt was thus supposed to have possessed two calendars—the one conforming to scientific truth, the other, in spite of all its inconveniences, used for administrative life, the two tallying exactly on one single day every 1460 years. Censorinus, who noted it in A.D. 239, attributed an indefinite antiquity to this period of Sothis, of which the only one that history has ever mentioned, and which ended, according to him, exactly 100 years previously (A.D. 139), was the last of a whole series. The statement of the author of the *de Die Natali*, taken up and commented on, represented from that time the view of official Egypt, which, in order not to stop half-way, imagined a Sothic half-period. 'Thy divine festival, Sothis, is celebrated every 730 years,' says the Philæ inscription.

The idea that the priests knew and employed the period of 1460 years led naturally to the inference that they were acquainted with, and employed, an exact Sothic year reserved for their use. The supposed use of a double year in Egypt and the idea of comparing the whole with the astronomical year have been further complicated, in modern science, by the use of a terminology (vague year, civil year, astronomical year, sacerdotal year, heliacal year, solar year, etc.) whose meanings vary according to the authors. The whole has been the subject of most difficult controversies from the time of Champollion down to the present day. It is strange to notice that the two initial data of the whole debate have been neglected—(1) Did the Egyptian word *pirit* mean 'heliacal rising,' or simply 're-appearance of the star on the horizon'? (2) Do the exact astronomical calculations adapt themselves to the argument? Nevertheless, it was not until 1909 that Legge (see literature at end of art.) raised these questions.

The reality of the Sothic period has given birth to infinite discussions for or against its existence (cf. the innumerable works on the subject in Egyptology). An incredible amount of patience, calculation, science, and ingenuity has been expended for a hundred years without the question having advanced one step, and the Egyptological School remains, to-day as formerly, divided into two equal camps. For the long and ingenious pleas of the ancient Fourier or of Wilkinson in favour of the Sothic period, too feeble to cope with the objections of a Krall, modern defenders have substituted more sound reasoning based on the monuments. But, in proportion as their scientific weapons were being improved, their opponents were striving after progress in the same direction. Neither the clever refutations of Maspero nor the objections, full of practical common sense, of Budge, were able to convince Borchardt, Mahler, or Sethe, any more than Birch long ago succeeded in persuading Rougé; and the latest works of Meyer or the vehement assertions of Breasted show that the Sothic period can always count on a number of determined and serious partisans. Each new discovery of an Egyptian document mentioning the heliacal 'rising' (?) of Sothis is therefore the signal for heated discussions for at least three or four years; cf. *e.g.* the bibliography on the subject which followed the publication, in 1898, of the Kahun calendar (XIIth dynasty). The intermediate opinion of Erman (holding to an exact agricultural year, and, up to a certain point, a sacerdotal one which agreed with the rising of the waters and the indications of Nature for practical life, while the year of 365 days remained in use on account of the value of its administrative symmetry) does not seem to have secured the support of either party. The refutation of Meyer by Torr (*Memphis and Mycenæ*), also quite recent, seemed to sum up the strongest practical objections which had been raised, with discussion based on the detail of the monuments and the nature of the above-mentioned astronomical facts. The attempt of F. A. Jones (*PSBA* xxx. [1908] 95) does not seem to be of any practical value. Lastly, Legge (*Recueil des Travaux*, xxxi. [1909]) was the first who thought of bringing the question on to scientific ground, which was what ought to have been done first. His strictly mathematical statements allow none of the proposed dates to hold good, and seem to give the *coup de grâce* to all attempts to draw chronological inferences from the system of Meyer.

A similar number of works, during almost a hundred years, not only shows the difficulty of the problem, but tells plainly of its importance. It does not consist in the question of the degree of science to which Egypt had reached, but in the application of the data to chronology, which the absence of every era and synchronism outside of Egypt renders extremely obscure when we go further back than the XVIIIth dynasty. The fact of finding at least six or seven references to the calendric date of the supposed heliacal rising of Sothis or of the height of the Nile at a given month, and the circumstance that these texts reach from the VIth to the XVIIIth dynasty, would give the key to the whole system, if it could be established that the calendar remained unchanged from the Ancient to the Modern Empire. A simple calculation would be sufficient to fix these guiding marks, and consequently to obtain from them the exact date, or very nearly so, of all the reigns or adjacent events. This is enough to show the value which all the historian partisans of the Sothic period may place upon the demonstration. The doubt which may legitimately be conceived does not arise from the degree of science which the system supposes. It does not imply any more patient observation than others known to less perfectly evolved civilizations; *e.g.* those which the fine works of Seler have brought to light for pre-Columban America (Venus-period, etc.). The objection derived from the inexhaustible patience implied in the Egyptians resigning themselves to see the two calendars in agreement only once in fifteen centuries is not absolutely decisive. The chief obstacle is found elsewhere: (1) in the complete absence of any formal mention of such a period in the classical texts; (2) in the actual contradiction presented by monuments like the Medinet-Habu calendar, or the significant silence of Herodotus on the divergences between the real year and the official computation of time; (3) in the technical objections of an exclusively astronomical kind, which have attracted too little attention throughout the whole controversy (secular shortening of the length of the solar year from equinox to equinox, confusion with the sidereal year [star to same star again], and omission of the problem of the anomalistic year [perihelion to perihelion]); and (4) in the evident impossibility of making use of indications of the supposed Sothic period without arriving at impossible chronologies (*e.g.* for the date of the XIIth dynasty, as Wiedemann has clearly shown [*OLZ* iii. 322]; or F. A. Jones's deduction that the Great Pyramid was built in 2170 B.C.). The series proposed by Breasted is itself subject to objections which in the end throw the whole matter into question again. See the conclusions of Jones, *PSBA* xxx. 5; Lefébure, *Act. Orient.* xiv.; Liehlein, *ZÄ* xliv. 101, and *Chronologie*; or the interminable unsettled discussions, during the years 1904 and 1905, of Meyer, Brix, Borchardt, Sethe, and Mahler in *ZÄ* xli. 26, 34, 38, *OLZ* viii. 6, *Untersuchungen*, iii. etc.); also the literature on the subject at end of article.

The magnificent reform of Ptolemy III. was very far from being accepted with the obedience which history manuals usually attribute to ancient Egypt. The old national year persisted in practice until the time when the edict of Augustus (A.D. 10) made the year of 365¼ days compulsory. The type was henceforth proposed to the classical world, and in its eyes Egypt was the country of high scientific culture to which it had to look for its models of reform. It is well known that it was the Egyptian Sosigenes of Alexandria (Macrobius, *Saturn.* i. 13) who definitely reformed the intolerable Roman calendar, and who, under Julius Cæsar (year 'of confusion'), at last gave the Mediterranean world a date derived from a calendar copied from the Egyptian model, with the necessary modifications for the seasons. We may therefore say that it is Egypt that has given us our calendar. The twelve minutes and twenty-nine seconds of deviation from the real time which it presents every year, and which make it necessary to drop out a day every 131 years (Gregorian year = 365·2425 days; solar year = 365·242918 days—in the year 1910), did not need to be taken account of until many centuries later. The Julian (properly speaking, Egyptian) calendar continues to be law in Russia and in the Oriental Christian world, which ignored the reform of Gregory XIII. (1582), as England itself did until 1752. Lastly, the Copts preserved not only the Julian year, but also the 1st of Thoth for the beginning of their year, which now falls on the 11th of September, after having started on the 29th of August in the year regulated by Energetes.

V. *FUNDAMENTAL CHARACTER.*—If the Egyptian calendar is compared with other calendars

not for its perfection but for the characteristics of its original elements, it reveals significant differences. The basis of its divisions, of its conspicuous dates, and of its festivals seems to be neither solar nor of a really agricultural nature.

Neither the solstices nor the equinoxes were used, as with so many other races, to mark the beginning, or the internal divisions, of the year; and the significant absence of myths or ceremonies referring to these phenomena (although Egypt was acquainted with them, as Brugsch noticed in his *Myth.* p. 671) is a decisive fact, which is corroborated by an examination of the Books of the Dead or the Texts of the Pyramids. The legend of Râ grown old is of late date. The statements of Plutarch referring to the feast of the autumnal equinox (22nd of Paophi) and of the winter solstice should not lead us astray any more than the 'little sun' or the 'infant sun,' which is assimilated with Socharis, and is the sun of the winter solstice. The whole thing, like the festival of the 30th of Epiphi, or that of the 'beginning of Summer,' belongs to Roman times. The interpretation of the sources in order to find out facts of this kind shows two elements combined in equal quantities: the influence of Græco-Roman civilization, and the final assimilation of ancient myth to the sun's courses (*e.g.* the winter solstice assimilated to the search for the parts of Osiris). The dates themselves, however, often show the recent entrance of these solar characteristics into the Egyptian calendar (*e.g.* the self-styled winter-solstitial character of the festival of Socharis, celebrated from the very beginning in the month of Choïak, necessarily supposes that month to have become the month of December, and consequently the 1st of Thoth carried back to the end of August, *i.e.* the accomplishment of the Ptolemaic reform).

This statement does not in any way contradict the high degree of Egyptian astronomical knowledge, or the position held in Egypt by the worship of all the primitive sun-gods, or the importance of the Râ-sun from proto-historic times to the historic period. But everything connected with its existence, its powers, its battles, the risks it ran, its birth, its zenith, its disappearance, and its travels over the world, had, from the time of the earliest theologies, been included in the daily cycle. The archaic texts or the compositions of the Theban age give sure evidence of it. It should also be noted that the prediction of eclipses was never attempted, and that this phenomenon was always to the Egyptian the unforeseen danger, and not the mythical theme which gives rise to symbolical allusions inserted in calendric cycles. The moon, with the sudden changes connected with it, had the same fate. Except the facts of the lunar month, there is nothing to be found resembling a cycle, or attempts to systematize eclipses. A sun whose whole existence is contained in a day, a moon with a longer and more varied life, the daily struggle between light and darkness, the fears of evil connected with this fact, the risks suddenly arising from the diminution at unforeseen times of the brightness of one or other of the two great luminaries—all these things are closely related to primitive religions, which the uncivilized races of the present day have not yet been able to get beyond. And the statement that these rudimentary data became solidified, *without evolving*, in the Egyptian religion of the historical period, shows of itself that, if the Egyptian calendar acquired its technical value and the superiority of its symbolical views or its moral character, it must have got them from other elements.

The absence of characteristics based on climatological or meteorological phenomena is no less remarkable. There are no anniversary dates, or seasons connected with states of the clouds, régime of the winds, or periods of cold or heat. Gods like those of the winds, who played important parts elsewhere (*e.g.* in Chaldæa and America), are unknown in the classical Egyptian calendar. And its divisions are not arranged according to anything resembling phases of germination, blossoming, or maturity of the natural or cultivated products of the earth, and, however far back we go, there is not a trace of a pastoral calendar, like that of Basutoland, for example. An exclusively agricultural country like Egypt should *prima facie* have based its calendar on the changes of the cultivation of the earth. But the latter did not play any direct part in it, except irrigation (see below). There is nothing to be found resembling the festivals of ploughing and sowing, and the panegyric of Mîn at Medinet-Habu is the only example where the harvest intervenes, *as a simple episode*, in a religious festival. We saw above (p. 92[b]) that the seasons of four months had above all a symmetrical character, but no real agricultural one. In the description of the seasons, it is stated that for the months neither agricultural denominations are to be found, nor legends, proverbs, adages, popular poems, nor any of the hundreds of significant facts which so clearly mark the months of uncivilized races throughout Africa in general. The festivals themselves might deceive by their titles when we hear of them only from Plutarch or Strabo, or through the brief allusion in a papyrus to a festival at which honey or lentils are eaten, where one inhales the perfume of the *honit* or the *tekhui* flowers, or to festivals of 'fishing' or 'ploughing.' When the monuments give the commentary on them, we see at once that the principle of the festival has no direct connexion with these references, or that our translations are veritable mistranslations. Honey, *e.g.*, is eaten at the 'feast of the valley,' and this originally refers to the annual exodus of the souls of the dead when the protecting gods come for them. The *honit* flowers are a simple episode in a group of funeral offerings, in a festival based on the *dénouements* of the Osirian drama. The so-called 'ploughing' means 'digging the ground,' and the texts show that the reference is to a nocturnal rite connected with the mysterious wars against the spirits of evil. The Memphite festival of 'fishing' is a fragment of the crowning ceremony, in which the king catches the fish, or the game of the moor, 'as Horus captured and destroyed the cursed,' etc. And the Τδρευσις of the Alexandrian calendars, if it is not a recent invention, must certainly have had an origin connected either with the Osirian cycle or with the warlike themes of pre-historic legends, before it assumed the peaceful character in apparent connexion with the seasons which it has according to the Græco-Roman classics. In short, if it is evident that a country like Egypt necessarily associated its rural and agricultural life with rejoicings and ceremonies of every kind, and if Egyptian literature occasionally shows that this was so, it is none the less certain that nothing of all this served as a formative element in the establishment of the calendar of the year, either for its divisions or for its anniversaries (but see Frazer, *Adonis*, 1907, p. 283 ff.).

These circumstances are quite easily justified by the conditions of the Egyptian portion of the Nile Valley. Being nearer the equator, the people here paid less attention than those in the north to the gradual diminution of the power of the sun's rays, to its sinking on the horizon, or to the difference (much less noticeable there) between the summer day and the winter day. The winter solstice was not noticed there as the signal of a deliverance, or spring as the awakening of Nature; hence an original suppression of calendric elements which increased in importance the further north one ranged. And, just as Egypt was ignorant of all the myths arising from the melting of ice or snow, so she did not know of the great annual events which are marked by the aspect of high mountains, or the successive verdure of the forest; her year and her mythology received none of these impressions, so strongly marked elsewhere that they are a part of our own intellectual equipment. At the same time she was safe from all those great meteorological phenomena which, further south, determine the divisions of the year. She had no

'rainy seasons,' 'periods of storms,' 'monsoons,' or prevailing winds sufficiently marked to characterize a complete portion of the year. Her gods, who inhabited neither the mountain peaks nor the rain nor the thunder clouds, had certainly to be situated very high among the stars, or very low on the same plano as human societies. In the end, soil or climatology, latitude or geography, all tended to leave Egyptian thought face to face with a single remarkable phenomenon, the only one of vital importance for her, viz. the fluctuations of that river on which all life depended in the fragment of the universe known to her. And, after all, it was with the study of its movements and the anticipation of them that everything had to be connected that had a bearing on the measuring of time.

The dates and festivals relating to inundation are well known to us. The 'reception of the Nile,' which denotes the opening of dikes and canals at the time of the rising of the waters, is indicated in a number of funerary calendars (cf. below), but no mention is made of the day of the month on which it was inserted. It was a movable festival, as it is in modern Muhammadan Egypt. Libanius (*Æthiopica*, xi.) has described the festivals of Silsileh, during which a wooden statue of the Nile-god was carried in procession. This was simply the form of the festivals of the 'opening of the canals' of Middle Egypt, adapted to local geography, and with a different name. The present-day Arab 'night of the tear-drop' is merely the modern transposition of the 'night of the tears of Isis,' the announcement of the first perceptible sign of the annual inundation (20th June). Lastly, the festivals of Socharis in the beginning of October are perhaps an adaptation, to Memphite funeral ideas, of the first sign of the retreat of the waters.

There are not many of them in all; if Libanius, Heliodorus, and the Egyptian inscriptions give us different names according to localities and times, these Nilotic festivals altogether number at most two or three: the first quivering of the rising waters, the time of opening the Egyptian fields for irrigation, and probably the time when the Nile begins to decrease. But the principal date was not there. It was the date of the exact moment when the height of the waters reached the level necessary for fertilizing the ground, after almost a month of rising (about the 20th of July in the classical age, but probably later in pre-historic times, before the disappearance of several of the upper cataracts of Nubia). It was a question of finding a sure index, somewhere in Nature, which would mark the fact that a new year had just become manifest to the Egyptians.

While intent on detecting in the sky some coincidence between the coming of the waters and the appearance of the stars, the Egyptians noticed (and undoubtedly long before the time to which we can go back by means of the monuments) a remarkable phenomenon. Sirius (one of the seven stars of the constellation *Canis Major*), which was invisible from the beginning of June, again appeared in the east, some minutes before sunrise, towards the middle of July. Its re-appearance coincided exactly with the time when the Nile entered the period of high water for Middle Egypt. In this unfailing coincidence there seemed to be the most manifest sign of an indissoluble connexion between the spring-tide of the river and the rebirth of the star. It was, therefore, the re-appearance of Sirius that was adopted to mark the beginning of the new year: *νομίζεται διὰ τῶν ἱερῶν γραμμάτων νέον ἔτος εἶναι* (*Decree of Canopus*). The brightness of the star in the firmament was like the resplendent signal which unerringly announced the re-commencement of the gifts of the river. It was called 'a second sun in the sky.' Sirius (Egyp. *Sopdu*; Hellenized form *Sothis*) saw his glory associated with that of the sun; for it was 'like a crown on the head'; it was regarded as 'taking its place in his divine barque' on this first day of the new year. 'To be able to shine in the sky like Sopdu at sunrise' was a wish formulated in the texts for the destiny of the dead. Such a place in the national conceptions sooner or later caused the assimilation of the Dog-star with the greatest female deities of Egypt. The star 'by whose rising the years are counted' was the living image of Bastit and Sokhit, successively, and, according to local theologies, became the dwelling place of Isis, the star of Isis (*τὸ ἄστρον τὸ τῆς Ἴσιδος* [*Dec. of Canopus*]), or that of Hathor, or, rather, Isis and Hathor themselves. The confusion with the great Hathor of Denderah explains the strange ceremony of this temple, when on the first day of the year the statue of the goddess was brought on to the terrace of the sanctuary, there to receive the first rays of the rising sun. This was in order to realize literally and in this world what was going on at the same time in heaven. Syut, Assuân, and the temple of Thebes guarded most carefully the 'Ship of the Rising Waters,' which so many of the inscriptions attest to have been one of those relics which the kings tried to embellish and restore. Deified and assimilated with Sirius-Hathor, it was led to the river with great pomp on the first day of the year, and the local god—sun or companion of the sun—travelled on the bank that day, as if in material evidence of the fact that the return of Sirius, that of the annual Nile, and the new year of the sun were three aspects of the same act. Nor did the Egyptians hesitate to see in the rising of the star the real cause of the inundation; it was to Sopdu-Sirius that 'the abundant waters which spread over all the earth' were due (cf. Brugsch, *Matériaux*, p. 27). Once more in the religious history of humanity the relation was declared between what is seen in the sky and what happens on this earth. The most important date of the calendar thus became connected with the general theory of astrology. And the admirable constancy of the phenomenon, by urging the Egyptians to increase their observation of the coincidences, must have helped them to deduce the remainder of the calendar from the whole.

VI. *STELLAR NATURE; RELIGIOUS CONSEQUENCES.*—If the appearance of Sopdu was a remarkable case of the influence of the stars on our world, it was not an isolated one. This is not the place to repeat what is said of astrology in general, or to trace in detail its natural foundation, based on experimental pseudo-verification (see art. STARS [Egyptian]). The manner in which coincidences and the foreseeing of the return of influences were established in Egypt could not have differed in any way from what had taken place in the astrologies of other peoples (cf. *e.g.* for the Chaldæans, the excellent résumé of Maspero, *Hist.* i. 777). To these re-commencements of the same events, always in agreement with certain aspects of the sky, which man promptly determined, the animistic tendency immediately added another element. To these stars and their movements, to their combinations and their journeys, it gave the life and the representations of beings who struggle and act in this world. Because they seemed to draw silhouettes of men or animals, to appear like new-born children, to unite, or to knock against each other, people began to speak of their births, marriages, and struggles. These representations, made up of assembled stars, a Cambodian or Mayan calendar may draw differently; but they express

the same idea as that of an Egyptian or a Chaldæan. They are as old as the observation of man. From these two combined notions, influences, and representations, issued the detailed description of the forces by which this world is governed every hour. From these facts, duly noted, with the moment of their arrival, the Egyptian calendar emerged complete, portioned out with certainty, for the whole length of that year of which the appearance of a star was the important moment.

A third element determined its principal characteristics. Just as in the case of primitive, and modern non-civilized, races in general, this earth presented the spectacle of a perpetual struggle between thousands of visible and invisible beings. It was inexplicable in its confusion, so that it was almost impossible to discover whether the gods and spirits were the friends or the enemies of man. Thrown into the conflict, man did his best to conciliate the former and drive back the latter. The Egyptian, like the others, had very early connected the gods and good spirits with the sun, and the evil spirits with the darkness. The system did not lead him any further than the others, either for religious history or for ethics. On the contrary, when he conceived the notion of associating the spectacle of the terrestrial struggle and its combatants with that of the apparent conflict of the celestial beings, and when he combined the whole with the astrological data of influences, he realized one of the most decided advances ever known in the history of religions. At the same time, not only were the events of the terrestrial universe the result of those which happened in the sky, but they were the clear image, capable of being read in good order, of all that seemed so confused in this world. Henceforward the Egyptian became gradually more skilled in classifying the latter, and also the beings who took part in it.

The indissoluble link created in religion between the stellar world and the earth is repeatedly attested, at every time of ritual, by magic or so-called religious texts. The Texts of the Pyramids are a mine of valuable information for the very earliest times. They speak of 'the disturbances which we see in the sky,' of stars 'which fight,' and of 'bow-bearers who go their rounds'; and the study of allusions of this kind, not yet attempted, gives a long list. 'If the sky speaks, the earth trembles,' 'When the doors of the sky open, the doors of the earth open,' etc., on the other hand, are well-known phrases, among many others, of the ritual of the classical epoch.

The connexion established between the two armies of combatants led first to the assimilation of the facts, and then to that of the beings who were their agents. The astrological coincidences had given an opportunity of arranging, as far as the celestial world was concerned, the powers which were regarded as good and those which had to be looked upon as evil. The good naturally attracted to themselves the Divine beings or 'spirits' of this world who had a tendency to be rather the allies of man, and the evil did the same in the case of his constant enemies; hence the fusion of the stars (1) with the innumerable spirits or genii of primitive beliefs, (2) with the classical gods who took part in the life of man. It would be out of place here to justify the mechanism of these assimilations. They sometimes arise from the apparent form of the figures of the sky, sometimes from combinations of the conflict which seemed to be going on in the sky, and sometimes from purely astrological coincidences. Not only were the characteristics and representations of the Divine world particularly specified, but so also was the history of the gods, which the daily struggle of the sun interpreted too summarily ever to draw a complete mythology from it. There was the creation of legendary episodes in the life of the gods. It was putting into stories the battles which the stars seemed to fight, or the influences which they brought to bear on this earth. Formerly these things took place in the sky and on our earth at the same time. Henceforward they re-commenced on high, and annually subjected the domain of man to the same conditions as those experienced in legendary history. The anniversaries of marriages, travels, and 'births' (*e.g.* the Palermo Stone) of the gods were henceforth placed at fixed times by these re-commencements which man could note and predict by consulting the book of the celestial vault. At the same time, Egypt assimilated to this history, written for the celestial regions, the whole mass, which was up to that time confused, of its traditional, historical possessions: traditions more or less pure, more or less synthetized by legend or allegory, of great actual events of early times (invasions, wars, national catastrophes, organizations of society, etc.), or pseudo-historical summaries of origins. All this became incorporated by assimilation in the annual history of the stars; all this fixed the days. Facts, precisely stated, were henceforth inscribed, and their anniversaries were fixed for the days when the sky, by its tables and its different parts, presented the same arrangement as it had had before, at the time of these events. The whole gave rise to a national history, in which the gods and their legends were connected with the calendar by an indissoluble bond, and in which all that was seen in the country of Egypt still bore the material trace of their actions. For each part of the valley the theologies found etymologies which explained, in alliteration, the names of towns, sanctuaries, or hills by one of the legendary acts of the life of the gods, at the same time as they fixed the date of each of his acts in the year (Brugsch's *Dict. géographique* contains several hundreds of remarkable examples [cf. *e.g.* pp. 101, 174, 198]). The tendency to see this world only as a dependence and a momentary aspect of perpetual re-commencements was so strong that it marked the historical facts themselves with this trait. If kings are supposed to re-commence their terrestrial life *ad infinitum* in heaven, with the gods with whom they have become identified, the opposite is none the less true. What Pharaoh does on this earth is merely the repetition of the legendary Divine actions. And even their real historical victories—at least up to a certain point—were regarded as re-commencements by the calendars in which their anniversaries were inscrted (*e.g.* for Usertesen in the XIIth dynasty, Thothmes III. in the XVIIIth, etc.).

The Divine and historical legend, formed by these successive elements, gradually became a whole, so coherent and so closely connected with the calendar that the sky became a sort of index where people day by day read the annals of legendary Egypt. Each year the cycle was r newed with the return of the same influences. Pictographic reproduction and written notation of direct observations gave rise to books or pictures of them, the interpretation of which supplied both a date and a whole page of this history. For it was sufficient to *read* the positions of the stellar Divine beings to understand who they were, what they were doing at that precise moment, and what events had followed in the sky, of which the events of the present moment were the mere consequence.

We shall confine ourselves to noticing the Egyptian point of view of the matter. It may be said that Egypt came very near the possession of an astrological scripture, with all the imperfections and all the obstacles encountered by the civilizations which have attempted it, when they have reached the time for the application of scripture to economic and non-religious life. Egypt escaped this owing to causes which cannot be explained here. The point which must be noted by specialists is the interest which arose in establishing in what measure and up to what point other scriptures—notably in America—have

assumed similar characteristics, being at the same time astrological and mytho-historical; so that they possess a double value of great importance for modern science.

The result of such a system was to subject each moment of the calendric year to an influence of one or more of the Divine beings. Egypt made a detailed application of it. Naturally the months, the seasons, and the 'decades' had their protecting deities, and the general theory could not fail to extend the system to the days. Those gods who governed the months ended by giving them for the most part the names which have just been cited (although the lists of the monuments are far from agreeing; cf. Budge, *Gods*, ii. 293). The names of the gods governing the 360 days (cf. Brugsch, *Matériaux*, p. 47) have been regarded as an invention of late date, but always in ignorance of older documents. They are perhaps as old as the gods of the 'decades,' of which we now possess lists of the time of the Xth dynasty (cf. below). Theology could not fail to push the distribution of Divine protectors to its furthest limit, and charge a god or a spirit with each hour of the day (Budge, *Gods*, ii. 294, 302). In short, there is not a moment when special influence, denoted by name, is not being exercised, either on the whole of Nature or specially on each of the creatures of this world.

The consequences of this calendar had infinite applications. At first haltingly, then less awkwardly, theology realized in these infinite re-commencements the notion that time does not exist, since it is reversible. The perpetual renewal of the conflicts assumed, in a theoretical form which gradually became more dogmatically abstract, the problem, confronting primitive man, of the conflict, also infinite, which goes on in this world between good beings and harmful beings. In describing and organizing it, the calendar not only created astrology; it attracted the attention of man to what he could do on those vital dates when the battle returned to decisive moments. Everywhere, even where religion had succeeded in reading in the sky that events re-commence continually and endlessly on this earth, experience, nevertheless, showed that the κόσμος is unceasingly disturbed by the return of evil. The endless duration of the re-commencements of victorious good was therefore an endless duration *in fact*, but in no way guaranteed for the future. There was always doubt concerning the final success of the beneficent powers. This distress of mind was greater in the religions which were unable to rise to the calendar. But both classes attempted to evolve the manner in which man may intervene in order to contribute to the success of the good spirits. The less civilized knew no way of taking part in the conflict except at the times when they were surprised unawares by its spectacle in the sky (*e.g.* the numerous accounts of intervention at the moment of eclipses of the sun or of the moon). Elsewhere the conflicts are precisely stated at lunar dates, especially equinoctial or solstitial. In every case the intervention of man made use of the same resources—a mixture of mimetic and sympathetic magic. Images of dolls, of battles, of travels, of voyages were and are still made all over the world. The Eskimos, the Aleuts, the Columbians (cf. artt. ESKIMOS, ALEUTS, etc., in this encyclopædia, and see *GB*^{2}, for many examples), when intervening in favour of friendly gods, acted in the same way as in the case of the collective mimetic ceremonies for fishing or hunting. The Indians of California and the Polynesians carried about on certain dates a sun manufactured and conceived in the same way as the Râ-sun which Egyptian processions made to sail in a barque. But if the Egyptian concept has not a less humble origin, the perfection of the calendar has given us the opportunity of tracing the information much further back. Bound not to the agricultural world, but to the history of the heavens, the calendar multiplied the *foreseen* and *precise* occasions of human intervention. The pretended battles of the worshippers of the Egyptian gods, or the manufactured images, were similar to what the Banks Islanders, for example, were able to make in this order of ideas. But the details, shown in the sky, of the history of the gods supplied a multitude of remarkable details concerning what these worshippers could do. Festivals worthy of the name, processions, and real dramas followed. The imitation of the acts of the gods gave rise to the imitation of episodes in their life, and then to the imitation of their whole life. Symbolism and the progress of meditation, starting from this point, were able to lead to the obtaining of moral information from the esoteric sense (created, of course, afterwards) of the anniversaries of all the calendar. Thus a whole section of religious information is derived from those festivals of the Egyptian calendar which—a significant fact for their stellar origin—almost all have their starting-point in *night*. To this possibility of co-operating, exactly at the propitious moment, in the struggle for good, magic naturally brought its ordinary resources. Mimetic and sympathetic data, brought to perfection (costumes, statues, etc.), combined with the infinite power given by the knowledge of names (*q.v.*), and with the power of the voice, and of the chant in the incantation—in a word, with the complete arsenal common to humanity. In associating it with the science of the calendar, Egyptian religion was able to guarantee that, if the same gods (or their mimetic substitutes) repeated the same acts in the same places (or in their equivalents by 'geographical magic') and on the same days (fixed by the calendar), the order of the world was assured. And the worshippers who had contributed to them were sure to have acquired the most important merits in the eyes of the gods.

The consequences of such a system (which has necessarily been only very briefly stated) are evident:

(1) First there is the importance for each person of knowing the propitious moment for accomplishing an action or for abstaining from it, and of knowing the sum of the influences for each instant of life; hence the important rôle among the clergy which was played by 'the people of the hours,' or priests charged with controlling and fixing them. Hence also the position held in the life of the temple by those people of the *sḫu* (the Ptolemaic φύλαι), who, month after month, took charge of the whole service. These men were not so often scholars as watchmen (*urshai*), sentinels entrusted with the defence of the Divine castle.

The question of the technical perfection of Egyptian astronomy will not be examined here (see art. STARS [Egyptian]). Cf. as examples of its material implements, the apparatus published by Borchardt, *ZÄ* xxxvi. 67, and the emblems connected with measurement of time belonging to the religious observatory of Heliopolis, in Naville's *Festival-hall*, pl. ix.

(2) There is the part played in the life of the Egyptian by participation, in all its forms, in the dramas and mysteries, which, throughout the whole calendric year, reproduced in the sanctuaries, and for the purpose explained above, the phases of the life of the national gods.

The whole was translated into three practical applications, as far as the religion of living beings is concerned. Two are of a passive kind, and the third is active. (*a*) The production in pictures of the calendric influences common to all or belonging specially to one individual. These are the stellar pictures, the *decani*, and the zodiacs. (*b*) The drawing up of the list of influences for each day

(calendars of lucky and unlucky days). (*c*) The organization of anniversary days, when man intervenes on behalf of his gods, and repels the evil gods. These are the festivals, the processions, and the mysteries. Intervention of the dead or for the dead will be examined separately.

VII. *PRACTICAL APPLICATIONS.*—**1. Astronomical charts, etc.**—The number of documents and of works cited below on this subject permits only of a résumé of the chief notions, keeping in view the present state of science and the points not yet treated.

(*a*) *Astronomical charts.*—Charts of the sky, properly so called, considered in their connexion with the influences of each of the stars or groups of stars, must have existed from the very earliest times. As a matter of fact, as no ceilings of the temple of the Middle Empire have been preserved, we do not know of them any further back than the beginning of the second Theban Empire (Ramesseum). But the Texts of the Pyramids contain clear allusions to ordinances of the stellar gods, in astronomical pictures. These important references have never been pointed out, any more than the question has been discussed whether chapters xviii. to xx. of the Book of the Dead are not descriptions (more or less mutilated) of ancient astronomical pictures belonging to the oldest temples. Those of the temples of Esnèh, Edfu, Denderah, and Kom-Ombo, although of Ptolemaic or Roman times, and permeated with non-Egyptian ideas, are, in the main part of their wording, drawn from national chronicles. The collection and general comparison of all those pictures are still awaiting a special publication.

(*b*) *Zodiac.*—Babylonian influences, transmitted by Greece, brought into Egypt the generalization of the use of signs of the zodiac, the most famous types of which—those of Esnèh and Denderah—have been the subjects of very numerous works, which are, however, already out of date, and disregarded by modern Egyptology. It seems to be admitted in a general way that the zodiacs were unknown in Egypt before the Græco-Roman period. Their elements, nevertheless, are found on the tomb of Seti I., and they figure on a certain number of sarcophagi of the Saite epoch, or previous to the Greek period (cf. British Museum, No. 6678). Lastly, there are real indications that the signs of the zodiac were known and used as early as the first Theban Empire, according to certain allusions in the funerary texts, which have not yet been carefully studied.

(*c*) *Decani.*—Besides the course of the five planets, the Egyptians had noticed the rise, culmination, and setting of the stars. Among the constellations they attached special importance to those which they saw at fixed times sinking towards the horizon, disappearing, and then imperceptibly taking their original place after this disappearance. The 36 decades of the 12 months were placed under the protection of a number corresponding to these constellations when situated on the horizon. Hephæstion (4th cent. A.D.) has given in Greek a list of their names, the comparison of which with the Egyptian monuments has established greater exactness. For a long time Egyptologists thought that their invention belonged to the Theban epoch. They were found at Abydos, at the Ramesseum, at the tomb of Seti I., in that of Rameses IV., then on the sarcophagus of Nectanebo, in the temples of Edfu, Esnèh, Denderah, etc. The discovery of sarcophagi with texts of the Middle Empire has led to their recovery, with extremely curious details, as early as the Xth dynasty at least (coffin of Masahiti, and fragments of coffins of Akhmim). It seems certain to the present writer that allusion is made to them in the pre-historic formulæ of the Texts of the Pyramids. Each of the three *decani* of the month presides in turn over the decade of the head (*tapi*) of the month, that of the heart (*abi*), and that of the hind portion (*pahu*). Their variants and variations, as well as the remnants of time when the *decani* combine with the influences of the planets, laid bare to astrological research a vast region for special studies (cf. Lit. below, § VII., Daressy's recent contribution, 1909).

(*d*) *Stellar tables.*—The rôle of the *decani* is quite distinct from the checkered stellar tables noticed in the royal tombs (especially Rameses VI. and Rameses IX.). Erman (*Life in Ancient Egypt*, tr. Tirard, pp. 349–391) has explained their part very clearly, as well as the mechanism of the series of pictures, and the value of the legends. The positions of the stars, for a fixed time, and in connexion with the different parts of the body of an imaginary man supposed to contemplate them, are inscribed with respect to the configuration of the stars themselves. Unfortunately, the workmen who copied them have done so carelessly, and these tables are almost useless from the astronomical point of view. Nor is the religious nature of these strange documents very apparent. The opinion of Petrie (*PSBA* xxiv. 319), that they are simply horoscopic pictures referring to the nativity of the kings, is an ingenious way of reconciling the chronology based on the Sothic period with the contradictions presented in the tablets of the Royal Tombs; but no proof has been given of this explanation, which is too briefly stated.

2. Calendars of lucky and unlucky days.—Apart from the allusions in the religious or literary texts, the famous Sallier Papyrus and the Leyden Papyrus (i. 366) are the sources of the most valuable information. The methodical comparison with the similar tables of the Assyrians would be a fruitful study. Up to the present this has been too much neglected, most of the publications during the last fifty years limiting themselves to quoting and abridging the masterly work of Chabas, who is no longer at the height of present-day knowledge, either for translation or for commentary. The only advance made has been to point out, thanks to the Kahun Papyrus, that that sort of book existed as early as the XIIth dynasty. We have therefore another proof of the extreme antiquity of everything connected with the Egyptian calendar. It is necessary to call attention in a general way to the manner in which horoscopes are clearly connected, for each day of the calendar, with influences resulting from the chart of the sky on that day. The most striking proof lies in the importance—which till now has not been pointed out—of the division of the day into three parts, each of which is subjected to the influences which have control of the world at that moment. We may therefore have completely good days, completely bad days, or days partly good and partly bad.

The connexion is remarkable for the days on which one must not go out 'at nightfall,' or, on the contrary, 'as long as it is daylight,' or 'during the morning,' or 'at mid-day.' Each time the sign corresponding to this third of the day is marked as bad, the others remaining good.

The days are not simply good or bad, as we are usually informed. There are three degrees: the good, those which are prohibitive or purely bad, and those on which there is 'a struggle' in the world between good and evil. The facts of the celestial war by which these statements are justified are day by day put opposite this first diagnostic. Although they are deformed, as usual, by the unification caused by the Osirian legend absorbing all the old legends of the primitive gods, we can recognize the antiquity of all the facts mentioned When events and dates are noticed, we find most

of these facts either in the temple calendars (see below) or in the pre-historic texts of the Books of the Dead. Such a work, carefully treated, may lead to the explanation of a day in connexion with some of the scenes or the mystic texts of the tombs and temples. It must be said that the popular character of collections of the type of the Sallier Papyrus has been exaggerated. It is rather the practical application which deserves such a qualifying character, although even this point is doubtful. In order to give the document its full value, we have first to make a table of its interdictions, and see to what mythological (*i.e.* stellar) facts they refer. The most frequent prohibitions are against leaving the house, going out at a certain time, travelling, sailing, undertaking a piece of work, or undertaking anything whatsoever. Speaking, singing, and sexual intercourse come next. Certain things or persons bring misfortune if they are looked at on a particular day. Prohibitions against killing or eating certain animals are equally numerous, as well as those against setting fire to or burning certain substances. The whole, at first strange and childish, may be justified in each case by the study of the astrological myths connected with corresponding episodes in the history of the gods.

The corresponding *fortunes* have to be divided into quite distinct classes. Some are *risks* from which people may escape by observing the calendar: drowning; dying from plague or fevers; losing one's life 'by encountering spirits'; being killed by a bull or a serpent into which these same spirits have entered; remaining ill for the rest of one's life; 'dying for ever' (*i.e.* with no second existence), etc. Others are inevitable *destinies*, which happen whatever is done by the person born on that day. Very seldom good (long life, riches), they usually predict death by animals, by contagion, from a wound, from the annual epidemics (fever?), by drowning, or by sudden indigestion (*sic*). The mildest of them foretold deafness or blindness. The case of the child born on a certain day, who will lose its hearing 'because that is the day on which the ears of Osiris were sealed,' shows sufficiently the kind of deductions made for each day from the examination of the corresponding mythological facts.

The whole, subsequently adapted to popular superstition, gave rise to the base applications of sorcery, and to that caricature of real astrology which has reached us from the Egyptians of the last centuries, and from the Roman world, which was infested with their ignorant jugglers. The 'on that day' (*am haru peu*) of the sorcerers' formulæ is simply a return to the notion of ancient magic—placing oneself in the calendric conditions of time and surroundings necessary to reproduce the rôle of the god or the spirit who is most influential at that moment. It is, as a matter of fact, being inspired with the universal notion applied even at the present day by a fetishist sorcerer of the Congo. If a separation was made in Egypt between the puerility of these horoscopes, or practices, and the really religious ceremony of the official cult, that separation did not exist at the beginning. It took place when the notion of the calendar allowed the priest to go further, and to put in place of simple mimetic magic the noble theory of re-commencements, with a commemorative character, and with participation on the part of the worshippers. Priesthoods which are still rudimentary, like those of the southern tribes of the Victoria Nyanza, show how processions and sacrifices may arise from primitive barbarism when the calendric observation is more or less formulated. The Egyptian race, being better placed by nature, arrived at real temple-calendars, with the immense reserve of religious and moral forces implied by their final adoption.

3. **Temple calendars, festivals, ceremonies.**—The really surprising number of calendar festivals had caused even the Greeks to marvel (cf. Herod. ii. 59), but it is sufficiently proved by the origin and the value of such ceremonies as have just been explained. It will be noticed that cults regulated by astronomy (especially in Mexico, where the innumerable series of festivals astounded the first conquerors) have always been remarkable for the number of festivals, and probably for the same reason as in Egypt.

On account of the numerous documents of every kind (cf. § I. above), we are still able, not only to recover a large number of these festivals, but also (although with serious difficulties in the present state of science) to form an exact and detailed idea of the ceremonies and the precise purpose which they had in view. Such an important subject cannot be treated fully in the present article (see art. FESTIVALS [Egyptian]). All that need be recalled for our present purpose is what has direct connexion with the calendar, *i.e.* with the notation of the dates of the religious year, the relation of the episodes mentioned to the ceremonies carried through on the chosen anniversaries, and the religious character which gradually evolved, through these festivals, from primitive astrology.

The great majority of these innumerable festivals have a double common character which has never been pointed out. They begin at night, and have a dramatic and warlike signification. Many, indeed, are entitled day-festivals; but in every case in which it is possible to get back to the sources, they are seen to be in reality the continuation of an original festival or rite which took place during the night—a fact which is most important for the astronomical nature of their origins (see above). As regards the inward essence of the chief ceremony, it is very seldom of a joyful character. Undoubtedly, as throughout the world, the course of centuries and popular fancies added comic episodes and burlesques to it, and the assembling of great crowds has frequently introduced noisy rejoicings (cf. Herod. ii. 48). The real foundation of the ceremony is a battle, and the official rejoicing, noted by the calendars, is not manifested until afterwards, as a consequence of the victory.

The different kinds of anniversary festivals may be divided into twelve chief classes: (1) births of the gods, (2) episodes in the life of Osiris, (3) circumnavigations and voyages of the gods, (4) wars of the gods, (5) cosmogonic anniversaries, (6) funerals of the gods, (7) births and anniversaries of the kings, (8) commemorations of foundations, (9) festivals of the sun, (10) festivals connected with the Nile and agriculture, (11) exclusively funerary festivals, and (12) *miscellanea*, or of doubtful meaning (planting of the willow, inscription of the *Ashdu* tree, erection of the obelisk, etc.). We must not be led astray by such a classification. It is absolutely artificial, optical (if one may say so), because it takes account only of external features resulting simply from the titles. In every case in which we can see the details from the monuments, it may be said that the act *par excellence* of the ceremony consists in a conflict, in which the priests and the worshippers play the different parts of a real warlike drama. (We omit the anniversaries of births, the travelling of the Amon family to Luxor and its sojourn in its houses of rest, the festivals of the opening of canals, and others of the same type.) But festivals of apparently simple rejoicing, like those perpetual journeys of the gods to visit each other (Hathor to Edfu, Horus to Denderah, Hathor to Fayyum, etc.), or of simple *exoduses* (*khâu* = ἐξοδεῖαι) of the gods round the temple, or on their sacred lake, might at first sight be classed among the series of peaceful rejoicings *par excellence*. Nevertheless, as soon as the evidence of a classic (*e.g.* Herodotus at Papremis [ii. 63 f.]) frees them from chance, or as soon as texts (as at Edfu) detail them minutely, the episode of the battle appears—all as is shown, *a priori*, in

the brief mentions of the calendar of the Palermo Stone (killing the hippopotamus, striking the Anu, binding the Barbarians, etc.). Everywhere the gods attack reptiles or crocodiles, and cleave them in two—the serpent Apopi, and the serpent Sebaiu, etc.; at Heliopolis, Bastit, the Divine cat, cuts off the head of the serpent; the people of Pu and Dapu rush at each other, like those of Papremis; the partisans of the gods are attacked by hostile gods, escorted by their followers. Monsters of wax, of clay, of wood, or of rope (like the serpent made of rope which Plutarch says was cut in pieces at the festivals of Osiris) are pierced with blows, lacerated, cut in fragments by the priests or worshippers. Râ 'gets rid of his enemies' at Illahun. Every year, at the same 'place of massacre,' Edfu celebrates the 'defeat of the opponents of Horus.' If the feasts of the month of Choïak (they come from Memphis and are the result of the gradual fusion of Osiris and Socharis) are taken from the calendar of Abydos, the legend of the 'good god' seems to be formed from a series of warlike anniversaries, older than the oldest history. His barques are attacked, and his enemies are overthrown and cut in pieces. On the road to Pagar and on the lake of Nadit, the train of the procession fight with each other continually. Who would have suspected this character of the Osirian festivals, with titles so unwarlike, if we had not happened to possess the evidence of a dozen inscriptions on the point? Without the frescoes of a Theban tomb (Tomb of Kheriuf), who would ever have known that an apparently peaceful date like the planting of the *Dadu* included pitched battles with sticks between the priests and the accessories? Would it ever have been suspected that at the Memphis festival of fishing, the officiant, when capturing the fish, was 'seizing the enemies'? Hundreds of other festivals are distributed throughout the year, and warn us that these dates of the ancient calendars of the Book of the Dead are speaking of real festivals when they mention 'the night on which the children of the rebellion were destroyed' (it is represented on the pre-historic 'palettes'), that on which 'the cursed are exterminated,' or on which 'the enemies of Nih er-Dzer are massacred.'

From the examples just given, we may be allowed to infer that these battles also characterized the exoduses of Anubis from Syut, of Hathor from Denderah, etc. This induction is singularly confirmed when suddenly, for a festival whose warlike character is not mentioned by a single Egyptian text, the witness of Herodotus or Plutarch shows us the representation of wars or of the slaying of monsters overcome in them. Actually, as in the Sallier Papyrus, there seems each day to have been a battle in this world. But these are fought in the temples of Egypt, now here and now there, at places fixed by legend. This is the point that must be remembered for the present study, the classification and origin of the festivals as well as their picturesque details being treated in another article (FESTIVALS [Egyptian]).

The connexion between the character of these festivals and the origin of the calendar is evident. The festivals, which are neither anniversaries nor commemorations, in our sense of the word, but re-commencements, give rise to the detail of repetition in this world of this drama of the sky, of which they are the representation. And the participation of spectators in the massacre of the evil gods, the insistence by the worshippers (especially at Abydos) on the active rôle they filled in these sacred dramas, when they 'helped their god,' show a fundamental agreement between the magical data and the calendric data as the basis of the Egyptian cult.

This character of the anniversaries of temple calendars explains also the dates when the gods travelled and visited each other. These are not simply neighbourly relations, or reminiscences of the alliances of the pre-historic tribes of the Nile Valley. Although the course of centuries gives a character of rejoicing and pilgrimage to these festivals, the real origin is the imitation of the martial acts of the mythological life of the gods, thus shown forth with great pomp. And we saw above how—at least for the most part—it was the reading of the sky that suggested the principal episodes in it.

Thus by natural consequence the unchanged character of the temple calendar from the beginning to the end of history is proved. The study of historical documents shows that, as they existed under the Memphites, so we find the festivals under the Roman dominion. The only work done by theology was to generalize for the whole of Egypt some festivals which originally were merely local. But Egyptology has accomplished thus only part of its task. The study of the pre-historic texts of the Books of the Dead and the Book of the Pyramids proves that the festivals and calendric dates of these collections appear again, with names hardly modified, in documents of the historic age, like the Palermo Stone or the stelæ of the ancient Empire, and that the whole fits into the lists of the classical calendar.

The chief importance of the anniversary date is sufficiently justified by what has already been said. (The exact dates of the principal festivals will be given in the article FESTIVALS [Egyptian].) The way of marking it in the classical epoch consists simply in the indication of the season, the month, and the day. A different method seems to have existed in Heliopolis. Its character is difficult to grasp. The present writer proposes simply as a hypothesis of his own to read as calendric dates the numbers marked in the celebrated Palermo Stone, which have always been interpreted as agrarian measurements or as the heights of the Nile. He thinks it possible to see in them notations of height taken with some very simple instrument, or more specially the height of the shadow of some arrangement like the Babylonian πόλος—perhaps even the height of an emblem like a sacred stone, the prototype of Banbonu of the Great Temple (cf. Naville, *Festival-hall*, pl. ix.). With the same restrictions he thinks that the pre-historic vases or Thinite tablets of Neggadeh and Abydos contain indications of beginning, culmination, and end of phenomena used to date the festivals represented on these tablets. The correct interpretation, however, is not yet forthcoming.

The development of the theory of the anniversary festival in the calendar seems therefore to have been briefly: (1) the idea of the influences of the stars; (2) the putting of their positions into living images in the form of beings, conflicts, travels, births, etc.; (3) the notation of corresponding myths; (4) the assimilation of the conflicts which take place on the earth with this mythology; (5) as a consequence, the assimilation of the gods or spirits of this world and their legends with the conflicts and acts of the inhabitants of the firmament; (6) the combination of the whole into a unique cycle, the dates of which are given by the appearance of the sky; (7) the artificial creation, in order to correspond with these dates, of pseudo-historical or purely legendary facts; (8) the invention of the great Osirian drama, incorporating the myths or the disconnected accounts of the local proto-history of the various parts of Egypt (if necessary, with the aid of alliterations or artificial etymologies); (9) the tendency to confuse Osiris with the Râ-sun, and to see in the legend of Osiris a symbolical figure of the struggle between the desert and the Nile; (10) the gods, combined in the latest epoch, induce symbolism, the concept of the struggle between darkness and light; and (11), as a last result, there is the struggle of moral light with the darkness of sin, the struggle between good and evil, with the defence and active obligations which it entails for the worshipper.

The living worshippers of the god are not the only persons who participate in these annals of the calendar. The dead also take part in them, and fight on their side. The explanation of the theory of death among the Egyptians will be found in art. STATE OF THE DEAD (Egyptian).

VIII. *FUNERARY CALENDAR.*—1. Festivals.—The remarkable fixity of this calendar is attested by several thousands of monuments (not including the texts of the Book of the Dead type), from the Memphite *mastabas* to the titles of the tombs, or the stelæ of the latest epoch. From Memphis to the first cataract, every necropolis has supplied sufficient funerary calendars to draw up the inventory and to show the importance of its character. As far back as we can go at the present time (IVth dynasty), the work of unification for the whole of Egypt is completed (cf. *e.g.* the sarcophagus of Khufu-Anku). Two classes of dates and festivals appear: the first are common to all the provinces of Egypt; the second remain, throughout the course of history, local and peculiar to certain necropolises. The exegetic examination of those of the first class shows that they are the product of a list which combined festivals that were formerly peculiar to such and such a region. They began by belonging properly to the dead subjects of Socharis at Memphis, of Anubis at Syut, of Uap-Matonu at Abydos, of Hathor at Denderah, etc. The fact that as early as the IVth dynasty they are the common property of all the Egyptian dead, almost everywhere unified by the Osirian legend, is of sufficient significance to give an idea of the immense preparatory work that was necessary before the period known to us.

The chief list, identical at the beginning and at the end of history, gives: (1) the day of the year (1st Thoth), with the festival of lighting the new fire (the festival of 'lamps' of Herodotus, ii. 62), the 'service of the dead,' and the 'surrounding of the temple in procession,' a visit to the local god, in great pomp, at the dwelling-places of the dead (Beni-Hasan, Syut, Denderah, Thebes, Edfu, etc.); (2) the great festivals of the dead on the 17th, 18th, and 19th of Thoth (festival of lamentations, of the flame, and the *Uagait*); (3) the festivals of Socharis in the month of Choïak: sacred night, sacred morning, procession round the walls of the temple (originally round the sanctuary of the white wall at Memphis, then, later, in all the chapels of Socharis in Egypt). This is one of the most solemn moments in the life of the dead and in the calendar connected with it; in the Palermo Stone we find the feasts of Socharis mentioned in the whole historic series, sometimes with valuable details (cf. Revillout, *Revue Egyptol.* i. 43, with an incomplete bibliography, but full of important examples; cf. also the Kahun Papyrus of the XIIth dynasty and the very important text of the calendar of Nofir-hetep at Thebes [XVIIIth dynasty]); and (4) the festivals of the five epagomenal days. To the first group may be added the following calendric list, which is simply a table of funerary services to be offered to the dead, rather than festivals with processions or ceremonies of a mythical character: the beginning of each season, the beginning of the month, and the day of the half-month, the 4th, 5th, 6th, 17th (*sadzau*), and 30th of each month (see Munich, stele no. 3). There is no ground for asserting a relation between the monthly festivals and the moon, from the funerary point of view.

The indications of the stelæ enumerate afterwards a certain number of festivals already known to the non-funerary calendar: the rising of Sirius, the arrival of the Nile, the 'reception of the river,' the 'travels of the gods' from one town to another, visiting each other, etc.

Lastly, festivals probably common to the whole of Egypt are local in appearance, either because we have not enough documents, or because they bear different names according to the localities, although they are really identical (removal of sand, scattering of the sand, festivals 'of the mountain' or 'of the valley,' transferring of the statue to the temple). Thus at Thebes the 25th of Choïak is called *Nutirit.*

The festivals of Memphis (Exodus of Min, Assembly of Osiris Nib Dzoto), those of Beni-Hasan (great and small 'catching'), and those of Thebes (morning of Neheb-kau, festival of the two enchantresses, of the 'Assembly of Bailu,' of the 'hearing of speeches,' and of the 'opening of the chapel') are simple examples given here of the titles of local festivals. They have not yet been studied. It is probable that it will turn out that, under other names, they were celebrated throughout the whole of Egypt, and that their triple link will be found with mythology, with the corresponding formulæ in the Book of the Dead, and with the representations in the temples or the hypogæa. It seems to be already proved that these festivals, when they are mentioned, come from another part of Egypt—which presupposes a long preliminary work of fusion (cf. *e.g.* the Theban festival of Bailu, which is said to be consecrated 'to the souls of the dead of the Lord of Hermopolis').

The whole is accompanied, for the statues 'of millions of years' of deceased kings, by a complete special calendar. It is sufficient to state here that it consists chiefly of festivals of the clothing of statues, processions to the temples, and participation in the majority of the great festivals of the ordinary local calendar.

2. Historical summary: probable formation.—The fact that the calendar appears fully formed as early as the Memphites, and undergoes no essential change down to the end, admits only of a hypothetical explanation of the way in which it is formed: (1) by the examination of the peculiarities of the festivals; (2) by the direct or indirect mention of their origin; or, above all (3), by the archaic traces of a previous state of affairs in the Book of the Dead. The sarcophagi of the first Theban Empire are in this respect the next source of considerable discoveries. The most important at the present time are those of Babei, found by Petrie at Denderah (Cairo Museum), and those exhumed by Garstang at Beni-Hasan. As in the case of the festivals, we shall treat here only what is connected with the calendar, the rest of the funerary theory being more conveniently treated in the art. STATE OF THE DEAD (Egyptian).

The faculty, which at first was restricted to those who had within them one or more Divine souls (*i.e.* to chiefs, sons and heirs of the gods), of reuniting with the gods of this earth and of sharing in the direct offering of worship, was extended to those who were capable of understanding the necessary magical prescriptions, and who had received the necessary talismans. They were then able 'to walk on good roads'—to return to this world. They could do so only once a year, when the local god at his festival came to look for them in the necropolis. They then accompanied him as worshippers (*amkhu*) or as companions (*shosu*), and, along with the living in the procession, participated in the whole drama of the festival, and then in the offering. The whole thing could take place only in the locality in which the famous mythological fact had formerly occurred, and at the time when the sky indicated the exact date when the fact should be renewed by the festival (typical examples at Syut, at Hermopolis for the festival of Bailu, at Thebes for the 'festival of the valley,' at Denderah, etc.). This festival took place in many provinces, at the time of the annual rising of the waters and at the New Year—the resurrection of all the things of the valley (*e.g.* Fayyum, Heraclæopolis, Abydos, Denderah, Edfu, Assuân). But in other places it was at different dates (month of Choïak at Memphis, Pharmuti at Hermopolis, etc.). The continuance of the happiness of the dead was due to a triple series of continued actions, the benefit of which was evidently at first confined to the kings, but afterwards extended to ordinary men: (1) the introduction into the local calendar, with all its results, of the festivals of strange gods which fell on a different date, making the local

dead benefit thereby; (2) multiplying the circumstances in which each of these gods had the power of making the 'living soul' of the dead return to this earth; and (3) not restricting to a single place in Egypt the possibility of accomplishing the magical rite necessary for each day, but extending the benefit of it to all in the necropolises. This work in course of formation is seized on in texts like that of Babei, where the calendar already enumerates one hundred dates of festivals, in which, at a certain place, the dead person may take his share of such and such rejoicing of such and such a god (see also chs. xviii.–xx. of the Book of the Dead, which are very instructive on this point). The whole leads to the final possibility of communicating with the dead throughout the whole year. Then the long series of magical dates, which had become useless, was eliminated. There remains a unique calendar, general for Egypt, where the festivals simply mark the most outstanding remains of the ancient elements of formation. The final product is almost reduced to unity by the Osirian theme, which substitutes for the pre-historic *raisons d'être* of these dates explanations drawn from anniversaries of the life, death, and resurrection of Osiris. It is precisely this theological work, accomplished almost entirely in the time of the Memphites, which makes the discovery and real meaning of the original festivals so difficult. The search for these offers a large scientific reward to the person who will undertake it.

IX. *CONCLUSION.*—What has been said above may perhaps suffice to show that the calendar in Egypt played an important part in the degree of perfection reached by the evolution of religious thought in that country. If, as everything indicates, the material supplied by the gods and the concepts at the disposal of the ancient Egyptian cults was no better than that still employed by the groups of less civilized races of the rest of Africa, we must find out the reason why Egypt was able to profit more by it. And if, in a similar fashion, the organization of worship is one of the most important factors, it seems clear that the calendar, as it was instituted in that country, was one of the most powerful forces in ensuring this organization. The question leads to the search for the causes which favoured the perfecting of the calendar and gave it the form and the value which have been examined above (p. 97). The conditions of geographical and meteorological surroundings were perhaps not the only favourable elements in this first cause. They were certainly elements of the first rank.

Considering now not the causes but the consequences, we see that the calendar succeeded in identifying, dating, and, in definite mythologies, fixing, the limits of the apparent incoherence between the appearance of the perceptible world and its incessant struggles between good and evil. The intervention of man, foreseen and organized on certain fixed dates, arranged and defined relations with the gods, and multiplied the connexions with them, then the obligations towards them, at the same time as the rôle of the gods became more noble. It matters little that originally this human intervention was grossly magical; the essential fact was the possibility of man's helping the powers that were regarded as good to struggle against those regarded as evil. To define, in a gradually more elevated sense, the words 'good' and 'evil,' and to reach the duty of being morally a partisan of the good gods, was the long-protracted effort of thousands of years of Egyptian thought. The final notion of dualism, with its wholesome lesson of energy, existed in germ from the very day on which the year of the religious calendar definitely specified the rôle of each person, and the certain effects of the acts of man, in the ceaseless struggle in which he takes part.

It marked the race for ever with its stamp. Even after Egypt became Christian, it will be found that it kept this stamp and is distinguished by it from the rest of the peoples who believe in Christ. For the Copts, St. Michael and St. George on high *every day* conduct the celestial hosts to battle against the soldiers of Satan's armies. They seize them, beat them, hang them; but they do not destroy them, for 'their hour is not yet come.' In this way the Egyptians reconcile the new dogma and the ineradicable conception of the perpetual celestial battle, in which the worshipper, by his acts and prayers, comes to the assistance of his Protectors on high.

LITERATURE.—Roughly speaking, the bibliography of the Egyptian calendar exceeds a thousand publications, articles, etc., not including those dealing exclusively with astronomy, astrology, or pure chronology. A selection being necessary, there is given below a list which will be found to contain all the literature that is essential on the subject. Only a few items have been extracted from the long list of articles which have appeared in Egyptian periodicals, e.g. *ZÄ*, *OLZ*, *PSBA*, *RTAP*, and *Sphinx*. Such a bibliography, in view of the great variety of questions involved, would not be of much service if simply arranged alphabetically or even chronologically. A classification according to the subject-matter has appeared advisable. We have included also a list of the *documents* properly so called, *i.e.* the list of ancient monuments published with or without translation or commentaries, but without a synthetic article on the calendar. A list of the chief ancient authors who wrote on the subject has also been added. The most important authorities have an asterisk prefixed.

I. *DIDACTIC TREATISES, ACCOMPANIED BY DOCUMENTS.*—Biot, *Année vague des Egyptiens*, Paris, 1853; Brugsch, **Nouvelles recherches sur la division de l'année des anciens Egyptiens*, Berlin, 1856, **Matériaux pour servir à la reconstruction du calendrier des anciens Egyptiens*, Leipzig, 1864, *Thesaurus*, pt. ii. 'Kalenderinschriften,' Leipzig, 1883; Chabas, *Mélanges*, Paris, 1862, 1873; Champollion, *Mém. sur les signes employés à la notation du temps*, Paris, 1831; Dümichen, **Altäg. Kalenderinschriften*, Leipzig, 1863–65; Faselius, *Altäg. Kalenderstudien*, Strassburg, 1873; Gumpach, *On the historical Antiquity of the People of Egypt, their Kalendar*, etc., London, 1863; Lepsius, **Chronologie der Aegypter*, Einleitung, Berlin, 1849; Letronne, *Nouvelles recherches sur le calendrier des anciens Egyptiens*, Paris, 1863.

II. *DIDACTIC RÉSUMÉS OF THE STATE OF THE QUESTION.*—Breasted, **Ancient Records*, Chicago, 1906–07, p. 26; Budge, **Book of Kings*, xliii–lix, London, 1908; Maspero, **Histoire*, Paris, 1894–99, i. 204–213 (with list of the most important literature down to 1893).

III. *POPULAR WORKS.*—Bédédite, *Egypte* (Guide), Paris, 1900, preface, p. 99; Breasted, *Hist. of Anc. Egyptians*, London, 1908; Budge, *A Guide to the Egyptian Collections of the British Museum*, London, 1899, p. 180, *Gods of the Egyptians*, London, 1903, i. 435, 438, 517, ii. 110; Erman, *Life in Ancient Egypt*, tr. Tirard, London, 1894, p. 350, *Egyp. Religion*, London, 1907, p. 217 ff.; Pierret, *Dict. d'archéol. égyp.*, Paris, 1875.

IV. *DIVISIONS OF THE YEAR, CYCLES, PHŒNIX AND 'HUNTI' PERIODS.*—Brugsch, *Nouvelles recherches* (see above), and *Rel. und Mythol.*, 1884, p. 671; Champollion, *Mémoire* (see above); Gardiner, "'Mesorê as the first month of the Egyptian Year,' in *ZÄ* xlii. 136; Griffith, "'The Ancient Egyptian Year,' *PSBA* xiv. [1892] 260; Hincks, *On the Years and Cycles used by the Egyptians*, London, 1839, and *On the Various Years and Months in use among the Egyptians*, London, 1865; Mahler, *ZÄ*, 1890, p. 122; Martin, *Période égypt. du Phœnix*, 1864; Naville, **Festival-hall*, London, 1892, pp. 7, 21; Vincent, *Recherches sur l'année égyptienne*, Paris, 1865.

V. *ON THE SOTHIC PERIOD IN PARTICULAR.*—Borchardt, in *ZÄ* xxxvii. 80; Burrows, *Discoveries in Crete*, London, 1907; Fourier, *Recherches sur les sciences et le gouvernement de l'Egypte*, Paris, 1828; Krall, 'Studien,' in *SWAW* xcviii., Vienna, 1880; Lauth, *Aegypt. Tetraeteris*, Munich, 1878, *Sothis- oder Siriusperiode*, Munich, 1874; Lefébure, in *Revue Egyptol.* ix. 71; Legge, "'Is the "Pirit-Sopdou" a Heliacal Rising?' in *Recueil de Travaux*, 1909; Lesage, *Le Lever héliaque de Sothis le 16 Pharmouti*, Paris, 1860; Mahler, 'Die Apisperiode,' in *SWAW*, 1894, p. 832 ff., "'Sothis und Monddaten der alten Aegypter,' in *Actes du xive Congr. Orient.* 1906; Martin, *Date historique d'un renouvellement de la période sothiaque*, Paris, 1869; Maspero, 'Notes au jour le jour,' in *PSBA* xiii. 303, and *Revue Critique*, 27th Nov. 1906; Oppolzer, *Länge des Siriusjahres und der Sothisperiode*, Vienna, 1884, *Sothisperiode und Siriusjahr*, Vienna, 1885; Rougé, in *Revue Archéol.* 1849; Sharpe, *On the Return of Phœnix and Sothic Period*, 1849; Torr, **Memphis and Mycenæ*, Cambridge, 1896, p. 57 ff.; Wiedemann, in **OLZ* iii. 322.

VI. *CALENDAR APPLIED TO CHRONOLOGY.*—Ginzel, *Handbuch der math. und techn. Chron.*, Leipzig, 1906, i. 226; Griffith, in *PSBA*, 1896, p. 99; F. A. Jones, "'The Ancient Year and Sothic Cycle,' *PSBA* xxx. 95; Lefébure, 'Principales consé-

quences de la période sothiaque,' in *Rcv. Egypt.* viii.; Lieblein, **Chronologie*, Upsala, 1873, *PSBA* xxii. 352, and *ZÄ* xliv. 101; Mahler, **Die ägyp. Finsternisse der Bibel*, Vienna, 1885, *Chronol. Vergleichungstabellen*, vol. i. 'Aegypter,' Vienna, 1888, **Études sur le calendrier égyp.* (tr. Moret, Bibl. Musée Guimet, vol. xxiv.); Meyer, 'Aegyp. Chronologie' (*Abhandl. Königl. Preuss. Akad.*), 1904, **'Nachträge zur ägyp. Chronologie' (*Abhandl. Berlin. Akad.*),1907; Reisner, *Naga-ed-Dêr*, i., Leipzig, 1907, p. 28; Sethe, *Beiträge* (*Untersuchungen*, iii.), 1905, p. 127. As has already been said, it is impossible to give the complete list of publications or articles on the points of detail of the calendar applied to chronology. We shall call attention merely to Brix, *ZÄ* xli. 26, 36; Borchardt, *ZÄ* xxxvii. 80, xli. 84; Legge, *Report*, etc., *PSBA* xxi. 261; Meyer, *ZÄ* xli. 93; Lefébure, *Rev. Egyptol.* ix. 71, and *Actes du xive Congr. Orient.* i. 25; Lieblein, *ZÄ* xliv. 101, and *PSBA* xxii. 352; Mahler, *OLZ* iii. 202, v. 248, viii. 6, 473, 535, ix. 94, *ZÄ* xl. 78; Sethe, *ZÄ* xli. 35 (as examples of discussions, in a single period, on chronology in connexion with a particular fact).

VII. *ON THE DECANI IN PARTICULAR.*—Brugsch, **Thesaurus*, Leipzig, 1883–91, p. 131, *Aegyptologie*, Leipzig, 1889–90, p. 329; Daressy, "Une ancienne liste de décans égyptiens,' *Annales*, iv. [1904] 230, *Statues de divinités*, Leipzig, 1907, p. 351, 'La semaine des Egyptiens,' *Annales*, x. [1909] 21; Goodwin, *Sur un horoscope grec contenant les noms de plusieurs décans*, London, 1865; Lepsius, **Chronologie*, Einleit., Leipzig, 1849, p. 63 ff.; Romieu, *Lettres à Lepsius sur un décan du ciel égyptien*, Paris, 1870.

VIII. *ASTRONOMICAL AND STELLAR TABLES.*—Bilfinger, **Die Sterntafeln in den ägyp. Königsgräbern*, Leipzig, 1862; Biot, *Calendrier astronomique . . . trouvé à Thèbes*, Paris, 1852; Birch, *Astronomical Observations in the xvth Century B.C.*, London, 1864; Brugsch, **Aegyptologie*; Champollion, **Mémoires* (see above), *Lettres d'Egypte*, Paris, 1833, p. 230, *Notices*, Paris, 1844, ii. 547 ff.; Lepage-Renouf, **Calendar of astronomical Observations from Tombs of the XXth Dyn.*, London, 1874; Petrie, *PSBA* xxiv. 318 (*in fine*); Rougé, 'Mémoire sur quelques phénomènes célestes,' in *Rev. Archéol.* ix. [1852], 'Texte du document astron. et astrol. découvert par Champollion à Thèbes' (*Mém. Acad. Sciences*, xxiv. [1858] 455).

IX. *ON THE ZODIAC.*—Biot, *Mémoire sur le zodiaque de Dendérah*, Paris, 1844; Carteron, *Analyse des recherches de Letronne*, etc., Paris, 1843, *Description de l'Egypte*, 'Antiquités,' Paris, 1808–28, vol. iv. (zodiac of Denderah), p. 267; Champollion, *Lettre relative au zodiaque de Dendérah*, Paris, 1829; Henley, *Zodiaque de Dendérah*, Paris, 1852; Lauth, *Zodiaque de Dendérah*, Paris, 1865; Letronne, *Observations sur l'objet des représentations zodiacales*, etc., Paris, 1824, **Analyse critique des représentations zodiacales de Dendéra et d'Esné*, Paris, 1850; Max Müller, 'Figures zodiacales,' *OLZ* viii. [1903]; Mure, *Calendar and Zodiac of Ancient Egypt*, London, 1853; Saint Martin, *Notice sur le zodiaque de Dendérah*, Paris, 1822; Testa, **Sopra due Zodiaci scoperti nel Egitto*, Pisa, 1802.

X. *ON THE EPAGOMENAL DAYS IN PARTICULAR.*—Brugsch, "Ueber die fünf Epagomenen,' in *ZDMG* vi. [1852]; Chabas, "Calendrier des jours fastes et néfastes,' App. (*Bibl. Egypt.* xii. 204) (Leyden Papyrus, i. 346).

XI. *STUDIES ON THE ANNIVERSARIES OF SPECIAL DATES.*—Breasted, *ZÄ* xxxvii. 126 (festival of Amon at Thebes); Brugsch, **Dict. Géographique*, Leipzig, 1877–80, *passim* (the most important series presented in alphabetical order, and more complete than the lists of his *Thesaurus*), **Drei Festkalender von Apollinopolis Magna*, Leipzig, 1877; Devéria, 'Noub, la déesse d'or des Egyptiens,' *Mémoires Soc. Antiquaires*, xxii., Paris, 1853 (for the διάβασις of Amon); Rougé, 'Mémoire sur quelques phénomènes,' etc., in *Rev. Archéol.* ix. [1852].

XII. *ON THE DAYS OF THE YEAR.*—Guissard, *Étude sur les jours égyp. du calendrier*, 1886; Loiseleur, *Jours égyptiens, leurs variations dans les calendriers du Moyen-âge*, 1872; Rougé, 'Mémoire,' etc. (see above).

XIII. *LUCKY AND UNLUCKY DAYS* (apart from citations or analyses in general works).—Chabas, 'Le Calendrier des jours fastes et néfastes de l'année égyptienne' (*Bibl. Egyptol.* xii. 127–235); Griffith, **Hieratic Papyri from Kahun*, London, 1899, pl. xxv.; Goodwin (in Chabas, *Mélanges*); Maspero, *Études égyptiennes*, Paris, 1886–89, i. 20; Oefele, *ZÄ* xli. 117.

XIV. *STUDIES ON THE CALENDARS OF THE VARIOUS TEMPLES.*—Dümichen, *Der grosse theban. Festkalender von Medinet-Habu*, Leipzig, 1881; Greene, *Fouilles à Thèbes*, 1855, iv.–vi. (Medinet-Habu); Brugsch, *Drei Festkalender*, Leipzig, 1877 (Edfu); Stern, *ZÄ*, 1873, p. 123; Bouriant, **Recueil*, xv. 184 (Kom-Ombo).

XV. *ON THE DECREE OF CANOPUS.*—Birch, *Bilingual Inscription at Sân*, London, 1868; Brugsch, **Thesaurus*, vi. 154; Budge, *The Stele of Canopus*, London, 1903; Chabas, *Mélanges*, ii., *ZÄ*, 1870, p. 108; Krall, **Demotische Lesestücke*, Vienna, 1903; Lepsius, **Bilingue Dekret von Kanopus*, Berlin, 1867; Martin, *Mémoires Acad. des inscr.* vii. pt. 1; Miller, *Journal des Savants*, 1833; Pierret, 'Glossaire égyptien-grec,' in *Études égyptologiques*, Paris, 1872; Reinisch-Roesler, *Zweisprächige Inschrift von Tanis*, Vienna, 1865; Revillout, **Chrestomathie démotique*, Paris, 1876–80, i. 87; Sethe, *Hierogl. Urkunden d. griech.-röm. Zeit*, Leipzig, 1904, pp. 124–162.

XVI. *PTOLEMAIC CALENDAR.*—Birch, *On an Egyptian Calendar of Philipp Aridæus*, London, 1864; Robiou, "Recherches sur le calendrier macédonien en Egypte' (*Mémoires Acad. Inscr.* ix. [1878]); Strack, 'Kalender im Ptolemäerreich' (*Rhein. Museum f. Phil.* liv. [1898] 12, 27); Vincent, *Mémoires sur le calendrier des Lagides*, Paris, 1854, *Recherches sur le calendrier des Lagides*, Paris, 1858.

XVII. *FUNERARY CALENDARS* (only studies with commentaries, specially on these calendars).—Bénédite, *Tombeau de Néferhotpou* (XVIIIth Dyn.), v. of *Mémoires de la Mission Arch. Fr. au Caire*, 1889–1900; Budge, *Liturgy of Funerary Offerings*, 1909, p. 11 ff.; Petrie, **Denderah*, London, 1900, ch. viii. (coffin of Beh [VIth Dyn.]) 57 ff. (the chapter by Griffith) (XIth Dyn.?); Maspero, "'Les Fouilles de Petrie au Fayoum,' in *Journal des Savants*, 1900, p. 456 (XIIth Dyn.), 'Sur quelques textes,' etc., in *Bibl. Egyptol.*, *Études de Myth. et d'Arch. égyptiennes*, ii. 1893 (Xth Dyn.).

XVIII. *ANCIENT DOCUMENTS* (reproduced or written without systematic commentary. The classification is chronological. It does not include either the Texts of the Pyramids or the version of the Book of the Dead dating from the second Theban Empire).—(*a*) CALENDAR OF THE TEMPLE OF MEMPHIS (Palermo Stone).—Pellegrini, *Archivio Storico Siciliano*, new series, xx. 297. (*b*) FUNERARY MEMPHITE CALENDARS (as specimens only).—Budge, *Liturgy of Funerary Offerings*, London, 1909; Mariette, *Mastabas*, Paris, 1881–87. (*c*) TEMPLE CALENDARS OF THE FIRST THEBAN EMPIRE.—Griffith, *Hieratic Papyri from Kahun*, pl. xxv. p. 52. (*d*) FUNERARY CALENDARS OF THE FIRST THEBAN EMPIRE (as specimens only).—Griffith, *Beni-Hassan*, London, 1894, ii. 52 and pl. xii.; Garstang, *Burial Customs . . . at Beni-Hassan*, London, 1907, pl. x.; Lacau, *Sarcophages antérieurs au Nouvel Empire*, Cairo, 1904. (*e*) ASTRONOMICAL AND STAR TABLES.—Belzoni, *Narrative*, London, 1821 (stellar tables); Biot, *Calendrier* (do.); Brugsch, *Monuments*, Leipzig, 1857, pl. xix. (*decani*); Champollion, *Monuments*, Paris, 1835, pl. ccxxviii. etc. (astron. and stellar tables, chart of sky, etc.); Guilmant, *Tombeau de Ramsès IX.*, Cairo, 1907 (*decani* and star lists); Lefébure, *Hypogées royaux de Thèbes*, Paris, 1886–89 (do.); Lepsius, *Denkm.* iii, cxxxvii, ccxxvii, ccxxviii, Berlin, 1849–60 (do.); Rosellini, *Mon. del Culto*, Pisa, 1842–44, pl. lxiv. (do.). (*f*) CALENDARS ON PAPYRUS OF THE SECOND THEBAN EMPIRE.—Birch, *Select Papyri* (Sallier Papyrus iv.), 1841–60, *Facsimile of an Egyptian Hieratic Papyrus* (Harris Papyrus), London, 1876; Leemans, *Papyrus hiératique du Musée de Leide*, pl. ii. iii. (Pap. i. 345, Epagomenal days), Leyden, 1855. (*g*) PTOLEMAIC AND ROMAN TEMPLE CALENDARS.—Ahmed-Bey-Kemal, *Stèles ptolémaïques et romaines*, No. 22187, p. 182, pl. lix.–lxi. (Decree of Canopus), Cairo, 1904: Brugsch, *Thesaurus* (Pap. Roman epoch), Leipzig, 1884–91, *Matériaux*, p. xx (Calendar of Esnèh), Leipzig, 1864, *Description de l'Egypte: Antiquités*, iv. 21 (zodiac of Denderah); Morgan, *Komombos*, pl. 316 (Temple of Kom-Ombo), Cairo, 1907; Rochemonteix-Chassinat, *Le temple d'Edfou*, Paris, 1894, *passim*. (*h*) GENERAL DOCUMENTARY REPERTORIES: Brugsch, *Thesaurus* (see above), pt. 2; Dümichen, *Kalenderinschriften*, Leipzig, 1873.

XIX. *PRINCIPAL REFERENCES TO CLASSICAL AUTHORS.*—Clement, *Strom.* i. 21; Censorinus, *de Die Natali*, xviii. 10; Diodorus, i. 11, 36, 50; Hephaestion (for a first list of the *decani*); Herodotus, ii. 4, 42, 48, 59, 50, 62, 63, 88, 122, 171, etc.; Horapollo, *Hieroglyphica*; Macrobius, *Saturn.* i. 12, 16, 18; Libanius, iii. 17; Pliny, xviii. 167; Porphyry, i. 24; Plutarch, *de Iside*, xi. 17; Solinus, iv. 31; Strabo, xvii. 1, 45.

GEORGE FOUCART.

CALENDAR (Greek).[1]—1. The day (*ἡμέρα*, later *νυχθήμερον*).—As in English, so in Greek, the word 'day' is ambiguous, and may mean the time between sunrise and sunset, or the time occupied by one complete revolution of the earth on its axis, or, on the ancient theory, of the sun around the earth.[2] The latter is the strict meaning of *ἡμέρα*—hence the later coinage, *νυχθήμερον*, to avoid ambiguity, though in popular speech the former meaning prevailed.[3] Hence, in official reckonings, a day is a day *and a night*. It began, like the Jewish day, at twilight; *e.g.*, by Greek reckoning, July 2 begins at twilight on July 1.[4]

Divisions.—Unger thinks—we have not been able to discover on what grounds—that the Bab. division of the day into 12 hours, by means of the gnomon and sun-dial, reached Greece as early as 550 B.C. or thereabouts. In common parlance, however, *ὥρα* did not mean 'hour,' but only 'season,' till much later. The ordinary way of measuring time was, if any accuracy was required, by the water-clock (*κλεψύδρα*), while the popular divisions of time were, for the day: *ἕως* (dawn, including morning twilight), *πρωΐ*, *μεσημβρία* (midday), and *δειλή* (late afternoon),[5] to which we may add *ἀγορά*

[1] Abbreviations: Ung. = Unger in Iwan Müller's *Handbuch*, 1892 ff.; Farn. = L. Farnell, *Cults of the Greek States*, 1896; Gem. = Geminos of Rhodes, Teubner ed.; Mom. = A. Mommsen, *Feste der Stadt Athen*, Leipzig, 1898.

[2] There were counter-theories (see Plut. *De facie in orbe lunæ*, 923 A), but they found no favour, and were mere unsupported guesses.

[3] *e.g.* Aristoph. *Nub.* 2, *οὐδέποθ' ἡμέρα γενήσεται*; and the familiar Homeric *μέσον ἦμαρ*.

[4] *i.e.* 'civic' not astronomical twilight (see Ung.).

[5] Theophrastus, *De sig. temp.*

πλήθουσα, *i.e.* about mid-morning, and the Homeric βουλυτός, which, despite its name, indicating the end of the day's farm-work, does not seem to signify a very late hour; and, for the night: ἑσπέρα, ἀφαί (lamp-lighting), μέσαι νύκτες, ὄρθρος (the dark hour before the dawn), and cock-crow,[1] which was the labourer's hour of rising.[2] Such a division of time, though very rough, corresponded to objective natural phenomena, and to the routine of daily life, and did well enough for popular use.

2. The month (μήν).—It is a somewhat vexed question[3] whether the month or the year came first, *i.e.* whether the Greeks, of their own invention or by foreign (Babylonian?) influence, divided one year into 12 months, or whether they put 12 months together to form one year. Certain it is that both year and month, as well as the names of the seasons, occur in Homer, while Hesiod has a complete account of the reckoning of the month, and of lucky and unlucky days. The present writer's view is that both year and month, being natural divisions of time, are of native origin in Greece, and sprang up simultaneously. For, quite apart from the keen astronomical observation, aided perhaps by outside influences, which is so marked a feature of the *Works and Days* of Hesiod, the facts that it is about 30 days from one new moon to the next, and that 12 such moons bring us back to the season we started from, are common property, shared by such backward races as the N. Amer. Indians before the coming of the white man.

Divisions.—The 'moon' was divided not into quarters, but into thirds; μὴν ἱστάμενος (waxing), μεσῶν[4] (central), and φθίνων (waning). Hence the usual reckoning of the days, say of Boedromion at Athens, was (after the 1st) 2nd, 3rd, etc., ἱσταμένου; 11th, 12th, 3rd 'after the 10th' (ἐπὶ δέκα), '4th after the 10th,' etc.; 20th, and then, by a curious inversion, 10th, 9th, etc., of the wane, counting backwards, to the 29th (δευτέρα φθίνοντος); though a direct method of counting (δευτέρα μετ' εἰκάδας, . . . τριακάς) was also used. 'First tenth' and 'second tenth' were also used for 20th and 21st in Attica, while the 30th was ἕνη καὶ νέα (see below, 'Year').

Both the month and its divisions are connected with certain vague beliefs of a religious nature—or perhaps 'magical' would be a more accurate word to use. Just as with us superstitious people regard Friday as unlucky, so the Greeks[5] regarded both the 4th and the 24th as dangerous days for some enterprises; the 5th as utterly unlucky; the 16th as an unlucky birth- or marriage-day for a girl; the 14th as a good day to break in cattle, etc., and so on through the whole month; 'one day is like a step-mother, another like a mother.'[8] But especially—this is probably a belief of later origin—certain days are sacred to certain gods. Thus the 7th[7] is Apollo's birthday, the 4th is that of Hermes and of Herakles, and so with several other deities. The great festivals of the various deities were yearly, though often on the god's particular day of the month. Obviously the mere question of expense prevented a costly feast to Apollo or Zeus being celebrated monthly; but it is at least probable that the old monthly holy days were recognized to some extent in the regular temple-worship, just as every Sunday commemorates, by its position in the week, the Resurrection, although Easter Sunday occurs once only in the year.[8]

[1] See Aristoph. *Nub.*, *ad init.*
[2] Lucian, *Gallus*, *ad init.*
[3] See Ung., and contrast Mom. p. 3.
[4] This term is very rare.
[5] At least, Hesiod's compatriots; *Op. et Di.* 765 ff.
[6] *ib.* 825.
[7] *ib.* 770 ff., with Göttling's notes.
[8] It must be remembered that, as the Greeks had no week, any superstitions or practices connected with days occurring oftener than once a year would naturally be monthly only.

3. The year (ἔτος, ἐνιαυτός).—Very early in the history of Greece, either by native observation or by imported science of a rudimentary kind, a smattering of practical astronomy became fairly widely diffused. Hesiod[1] indicates the beginning of the reaping-season (summer) and the ploughing-season (autumn) by the rising and setting of the Pleiades—a constellation which had attracted the attention of many primitive races[2]—and frequently makes similar observations. This, together with the observation of the equinoxes and the solstices,[3] provided them with the material for calculating a solar year. At the same time it led to endless confusion, for the lunar month was adhered to throughout: *i.e.*, whereas our (Julian) year is purely solar, and the new moon may or may not fall on the first day of any particular month, without in any way affecting our calculations of dates,[4] the Greek year was soli-lunar—almost a contradiction in terms, since the solar year is roughly 365¼ days, and the lunar month about 29½ days. This gives a lunar year of 354 days—a discrepancy which more exact calculations, such as the Greeks of the historical period could and did make, render still more apparent.[5] But the month, with its holy days, was a fixture. To a Greek, it would seem wholly unsatisfactory to celebrate Christmas on the 25th day of the last calendar month of the year; he would think it necessary to celebrate it, nominally at least, 5 days from the end of the last moon of the year. Similarly, a New Year's day which was not a day of new moon would seem an absurdity, even if it coincided exactly with a solstice or an equinox.

'It was,' says Gem., 'the endeavour of the ancients to conduct the months in accordance with the moon, but the year in accordance with the sun. For the direction given by laws and oracles, to "sacrifice according to the ancestral rites," was interpreted throughout Greece in those terms. Now, to conduct the year according to the sun means to offer the same sacrifices to the gods at the same seasons of the year, *e.g.* always to offer the spring sacrifice in spring; which is impossible, unless the solstices and the equinoxes fall always in the same months; while conducting the month in accordance with the moon means to name the days in accordance with her phases.'[6]

Hence, despite all difficulties, the soli-lunar year was adhered to persistently in Greece proper, and even in the Middle Ages we find Byzantine pedants speaking of it as if it were still in being. Thus Tsetzes, *Posthom.* 770 (13th cent.), gives the Attic month Hekatombaion the equivalent it would have had in his day if the Attic calendar had still remained in use. Apart from this trifling, which reminds one of Bélise begging the notary to 'dater par les mots d'ides et de calendes,' we have the evidence of Julian[7] that in the 4th cent. the Roman and Egyptian solar calendars were not in use among the Greeks.

The Greek year of 12 lunar months contained, as has been said, 354 days, the months having alternately 30 days (μὴν πλήρης) and 29 days (μὴν κοῖλος). The former was regarded as the normal number, hence the last day even of a 'hollow' month was generally called τριακάς, or 30th. In Athens, however, the name ἕνη καὶ νέα ('old and new') was frequently used to denote the day which belonged half to one month of 29½ days, and half to the next. This year, being 11¼ days too short,

[1] *Op. et Di.* 383, 615.
[2] Such as the Australian blacks (see Lang, *Custom and Myth*, London, 1885, 'Star-Myths').
[3] The latter—ἡλίου τροπαί—are several times mentioned in Hesiod.
[4] The movable date of Easter is an interesting survival of more ancient systems.
[5] Gem. viii. 37 gives the lunar month as $29\frac{1}{2}+\frac{1}{19}$ days, or 29 days 12 hr. 48 min. 38 sec. nearly. The impossibility of adapting this period, for practical purposes, to the solar year is obvious. He is speaking, of course, of the 'synodic' month, from one σύνοδος, or true new moon, to the next.
[6] Gem. viii. 6–10, somewhat abbreviated. The last sentence refers, as he goes on to explain, to such names as νουμηνία for the 1st of the month.
[7] *Orat.* iv. 155b.

led at a very early date[1] to an attempt at reform. The years were arranged in groups of eight (ὀκταετηρίδες), containing 3 leap-years (3rd, 5th, and 8th), each of which had an extra month (μὴν ἐμβόλιμος) of 30 days. This gave a total of 2922 days; whereas the actual total of 99 lunar months is roughly 2923½ days. The next stage was to add 3 intercalary days in 2 *oktaeterides*. This in turn resulted in getting 30 days ahead of the solar year in 160 years. This was rectified by leaving out one intercalary month.

Thus, by correcting alternately for the sun and the moon, something like a reasonable system of reckoning was arrived at. Throughout Greek history we meet the *oktaeteris*, which, it would seem, they came to regard as a natural period of time, like the solar year itself. At any rate, various festivals are arranged in relation to it. Thus, the Olympian games were celebrated every four years (half an *oktaeteris*), and the Pythian at the same interval, always coming in the 3rd year of an Olympiad; the Nemean fell in the 1st and 3rd, and the Isthmian in the 2nd and 4th years of the Olympiads. From the Olympian games came the familiar system of reckoning, which enables us, from 776 B.C. onwards, to extract fairly exact dates from Greek chronological notices. The various cities, however, all had local methods of reckoning—Athens dating by its archons, Argos by the priestesses of the temple of Hera, and so on. Even the Olympiad was not exactly reckoned in Athens, but was fitted to the local calendar, by being made to begin on the 1st of Hekatombaion,[2] whereas it really began on the 18th. We mention these facts, a little out of their order, to indicate why the *oktaeteris* was so tenaciously adhered to in spite of its fundamental errors.

For it was fundamentally wrong, owing to the constitution of the year, which always consisted of alternate 'full' and 'hollow' months.[3] Averaging as they did 29½ days, they gave a lunar year of 354 days, the real length being about 354 days 8 hours; *i.e.*, the difference between 8 lunar and 8 solar years is not 90, but 87⅓ days, so that the 3 intercalary μῆνες πληρεῖς made the *oktaeteris* 2 days 16 hours too long. It would take some little time to notice this, as there was little exact science in Greece, but in the end it made itself felt—some of the festivals were clearly on the wrong days. Hence comes the bitter complaint of the Moon in the *Clouds* of Aristophanes:

'For,' say her messengers, the Clouds, 'she is abominably ill-treated, after all her kindnesses to you—real kindness, not just talk. . . . You calculate the days all wrong, you jumble them topsy-turvy, . . . when you ought to be sacrificing, you rack witnesses and try cases; and often, when we gods are keeping a fast, in memory of poor Memnon, or of Sarpedon, you pour out libations and laugh.'[4]

If the Moon had just cause to protest, the Sun got no better usage. The Athenian year was supposed to begin with the summer solstice; but, as its first month must begin with a new moon, it never did, unless the two events happened to coincide. So serious did the whole matter become, that we actually find in late inscriptions a double system of dating, κατ' ἔτος (in accordance with the civic year) and κατὰ θεόν (in accordance with the actual position of the heavenly bodies). The latter was the method used for dating the *prytanies*. The year, in trying to be both solar and lunar, succeeded in being neither.

[1] There are allusions to it in various myths, as that of Cadmus' 8-year penance (see Ung. for a full discussion). For a brief account of the ὀκταετηρίς, see Gem. vii. 27 ff. The inventor is said, however, to have been Cleostratus (latter half of 6th cent.); Athen. vii. 278.

[2] See below, 'Divisions of the year.'

[3] Intercalary days were not dated; they were named by the date of the preceding day, with the word ἐμβόλιμος added. Hence they could not make a 'hollow' month 'full.'

[4] *Nub.* 610 ff., with Blaydes' notes.

In order to give a clearer idea of what the Greek year was like, we append an outline calendar of the civic year at Athens. The first month (Hekatombaion) began nominally at sunset on the day of the summer solstice (end of June); actually, on the next new moon, which might be the middle of July:—

Hekatombaion, 30 days; Metageitnion, 29 days; Boedromion, 30 days; Pyanopsion, 29 days; Maimakterion, 30 days; Poseideon, 29 days. Then second Poseideon, 30 days (in leap-year only); Gamelion, 29 days; Anthesterion, 30 days; Elaphebolion, 29 days; Munychion, 30 days; Thargelion, 29 days; Skirophorion, 30 days. Next year, Hekatombaion, 29 days, and so on. In later times, Poseideon 'the second' was called Hadrianion, after the Emperor. Other States repeated the twelfth month in a leap-year; but it was always twelfth or sixth. This example shows clearly enough the continual inconveniences to which the fixed alternation of 'full' and 'hollow' months subjected the Greeks; for the average number of days in a year was frequently one too few or too many, owing to the clumsy device of the intercalary month; hence the necessity for intercalary days.

Athenian astronomers were not slow to perceive the practical and theoretical disadvantages of the *oktaeteris*, and one of them — Meton — brought forward, in the year 432 B.C., a reformed calendar which, with the later improvements of Callippus of Cyzicus (a contemporary of Aristotle) and Hipparchus of Nicæa (2nd cent. B.C.), is surpassed in accuracy only by the purely solar calendars. He arranged the years in cycles of 19, with 7 intercalary months, giving a total of 6940 days, and allotting 29 d. 12 h. 45 m. 57 s. to the average month, and $365\frac{5}{19}$ days to the average year—only 30 m. 10 s. too long. Callippus combined 4 of these cycles into one, and subtracted one day, securing an average year of 365¼ days, and an average month only 22½ sec. longer than the actual lunar month. By a repetition of this process, Hipparchus, with a cycle of 304 years minus 1 day, attained almost absolute accuracy, but, it should be noted, still at the expense of anything like conformity with the sun; for, while the *average* year was accurate, any actual year was always 11¼ days too short, or else 18¾ days too long.[1]

But these cycles were merely theoretical; the *oktaeteris* was never, so far as we know, actually abandoned by any Greek State. Indeed, no State save Athens, for whose calendar it was calculated, could adopt Meton's cycle, and the evidence of Aristophanes (*loc. cit.*) and of late inscriptions as to double dating (see above) indicates that Athens did not. Diodorus, indeed,[2] says that 'most of the Greeks' accepted Meton's calendar; but this clearly refers only to individuals, for whose use, also, the almanacs (παραπήγματα) of which we occasionally hear[3] were constructed. The frequency of *pentaeteric*[4] feasts kept the *oktaeteris* in use. Hence, as has been already mentioned, the old imperfect calendar remained officially in use, getting farther and farther from the actual dates, until we find Macrobius equating Anthesterion (February, roughly speaking) with April.

Divisions of the year.—The Attic months have already been given. Other years, which began at the same time, were the Delian, whose months were Hekatombaion, Metageitnion, Buphonion,

[1] We omit small fractions; of course, 365¼ is a little more than the actual length of the solar year.

[2] xii. 36.

[3] *e.g.* Gem. xvii. 19.

[4] We should call them quadrennial. They came every four years, *i.e.* on the first and fifth of each period of five years, as the Greeks looked at it; hence twice in an *oktaeteris*. See, *e.g.* [Aristotle], Ἀθ. Πολ. liv. 6, 7.

Apaturion, Aresion, Poseideon, Lenaion, Hieros, Galaxion, Artemision, Thargelion, and Panemos; and the Delphic (Apellaios, Bukatios, Boathoos, Heraios, Dadophorios, Poitropios, Amalios, Bysios, Theoxenios, Endyspoitropios, Herakleios, and Ilaios). Bœotia began its year at the winter solstice (January), but the order of the months is somewhat obscure. Achaia, Phocis, and Laconia began in October (autumn equinox)—the first two simply numbered their months; the Spartan calendar is not yet re-constructed. After the rise of Macedon, their year (Dios [October], Apellaios, Audynaios, Peritios, Dystros, Xandikos, Artemisios, Daisios, Panemos, Loos, Gorpiaios, and Hyperberetaios) came into use in Asia Minor; while the Ptolemys used the Egyptian solar calendar (see CALENDAR [Egyp.]), as did also some astronomers outside Egypt.

A glance at the names of the months will show that they gather around and are named after certain festivals. Thus Boedromion is 'the month of the Helpers' (*βοηδρόμοι*), *i.e.* the gods and heroes who give victory in battle. Accordingly, we find most of the Athenian anniversaries of victories celebrated in them (see art. FESTIVALS [Greek], 'Attic ecclesiastical calendar'). Apellaios is connected with the name of Apollo; Dios with Zeus; Lenaion with Dionysos Lenaios, 'god of the wild women'; Galaxios recalls the Athenian feast of Galaxia, held in honour of Cybele; and Hyperberetaios is 'month of the Hyperboreans,' those 'carriers round' of the sacred offerings to Apollo, whose name in ancient and modern times alike gave rise to so much false etymologizing till Ahrens' masterly explanation finally threw light on the mystery.[1]

The position of the feasts, and consequently of the months named after them, depended very largely on the season of the year; for, in the long run, nearly every Greek festival or fast has an agricultural origin.[2] By whatever name the Greek might call his months, and however he might calculate the year, he divided it, in early times, into summer (*θέρος* [*ἄμητος*], later *ὡραία*), and winter (*χειμών*); or into spring (*ἔαρ*), summer, autumn (*φθινόπωρον*), and winter.[3]

LITERATURE.—1. Ancient texts: Geminus Rhodius, ed. Manitius, with notes and Germ. tr., Leipzig, 1898; Hesiod, ed. Göttling, Gotha, 1843.
2. Modern works: Boeckh, *Über die vierjährigen Sonnenkreise*, Berlin, 1863; Aug. Mommsen, *Chronologie*, Leipzig, 1883; Ad. Schmidt, *Handbuch der gr. Chronologie*, Jena, 1888; Unger, 'Zeitrechnung der Griechen und Römer,' in Iwan Müller's *Handbuch* (Munich, 1892), vi. 711 f.

H. J. ROSE.

CALENDAR (Hebrew).—1. Adaptations to meet astronomical difficulties.—As with other peoples, the basis of the Hebrew calendar was astronomical. The year was, roughly speaking, the solar year; the month was a moon period or lunation; the week comprised very nearly a quarter of a lunation; and the day was, of course, the period of the earth's rotation on its axis. The chief difficulty arose, as in other cases, from the fact that these periods stood in no distinct ratio to each other. The true solar year was not an exact number of moons, weeks, or days. The lunation was not an exact number of either weeks or days. The week of 7 exact days, whatever its origin may have been, had become a purely conventional measure of time. As the solar year is nearly 365¼ days, and the 12 lunations over 354¼, the lunar year of 12 lunations was about 10¾ days short of the solar year. The difference was at a later period, at any rate, adjusted by the insertion, about every 3 years, of an intercalary month; and, finally, by adopting a regular cycle of years, the slight irregularities were kept within bounds (see CALENDAR [Jewish]). The 12th lunation was called Adar, the intercalary month *wĕ-Adar* ('and Adar'). Some such arrangement, though not so definitely systematized, must have been in vogue from early times. Similarly, as a lunation averages a little over 29½ days, the month must have averaged 29 and 30 days alternately, with the further occasional omission of a day.

It has sometimes been assumed that there was no system among the ancient Hebrews for determining the commencement and duration of each month, and that it was merely a question of observation, the month practically beginning when the new moon first became visible—that is, about 2 days after the real new moon, and that without any calculation of the number of days since the previous new moon. There are two very strong, if not absolutely fatal, objections to this view. (1) The Feast of the New Moon was evidently of very early and general obligation (see 1 S $20^{5.18}$, 2 K 4^{23}, Am 8^{5}, Is $1^{13.14}$). It was practically necessary that it should be known beforehand when it would occur. That this was in fact the case we know from 1 S $20^{5.18}$, where Jonathan and David act on the knowledge that the next day would be the New Moon feast. (2) The fact that, even in early times, the months were definitely distinguished and had their several names (see below, 2. A. (2)), points obviously in the same direction.

It may be further questioned whether there ever was among the early Hebrews any attempt to adapt the week of 7 days to the lunation. There is some ground for such a supposition, in the fact that in the most ancient Babylonian calendar every 7th day of the moon—the 7th, 14th, 21st, and 28th—was a *dies nefastus*, on which no public or official work could be done (Sayce, *Higher Crit.*, 1894, p. 74). The similar treatment of the 19th day has been ingeniously explained as due to the fact that it was 49 (=7×7) days after the previous new moon; but this would be true only for artificial months of 30 days. It would seem, then, that the old Babylonian month was practically a period of 4 weeks, with one or two intercalary days added at the end to make it agree with the lunation. As to whether this system was ever adopted by the Hebrews we have no direct evidence; but, were it so, its obvious inconvenience must sooner or later, as with the Babylonians, have caused the substitution of the regularly recurring conventional week of 7 days.

2. History of Hebrew calendar.—It is not unlikely that the Hebrew calendar varied considerably at different times, and possibly in different places. We can at any rate, with considerable probability, make a broad distinction between the systems prevailing before and after the Exile.

A. (1) *In pre-exilic times* the year, depending, as naturally it would with an agricultural people, on the yearly course of the crops, appears to have ended with the ingathering of the vintage, 'the end of the year, when thou gatherest in thy labours out of the field' (Ex 23^{16}). This is confirmed by the fact that the Sabbatical year (Ex $23^{10.11}$ [E], Lv $25^{1-7.18-22}$ [H]) and the year of jubile (Lv 25^{8-17} [H and P]) were natural agricultural years, sowing, pruning, reaping, and the vintage being mentioned in their order. As regards the last, the enactment that the trumpet was to be blown on the 10th day of the 7th month shows that the idea of the year beginning in the autumn survived into a time when it could be called the 7th month.

It has been contended that, while for religious purposes, depending as they did on the agricultural seasons, the year continued to begin with the autumn ploughing, the civil year, on the other hand, from about the beginning of the monarchy,

[1] See Farn. iv. 102.
[2] See FESTIVALS (Greek).
[3] See Hes. *Op. et Di.* 383 ff., with Göttling's note.

began in the spring. This view is based chiefly on the phrase, 'at the return of the year' (2 S 11^{1}, 1 K $20^{22.\ 26}$), which is used with reference to the resumption of hostilities, and is followed in the first quotation by the curious remark, 'at the time when kings go forth.' But the first phrase, תְּשׁוּבַת הַשָּׁנָה, might mean 'at the turning-point,' *i.e.* the middle of the year—the idea being that the year moves forward to a certain point and then goes back; or what was intended may have been a year from the time of speaking (cf. Gn 18^{10}, where this is obviously the meaning of a somewhat similar phrase), and the words, 'at the time when kings go forth,' taken by themselves, merely state the obvious fact that military operations commence in the spring.

(2) During the same period the names of the months were probably adopted from the Canaanites. Two of the four pre-exilic names which occur in the OT have been found in Phœnician inscriptions—*Bul* thrice, and *Ethanim* twice (cf. *CIS* i. No. 86*a*). The four names are:

(*a*) *Ethanim* (1 K 8^{2}, where the editor, following later usage, calls it the 7th month). It is explained by *Oxf. Heb. Lex.* as 'month of steady flowings,' *i.e.* the month in which only perennial streams contain any water.

(*b*) *Bul* ('the eighth month' in 1 K 6^{38}), prob. ='rain month.'

(*c*) *Abib* (Ex 13^{4} 23^{15} 34^{18} [JE], Dt 16^{1}), in P (*e.g.* Ex 12^{2}) the first month. The name, which means an 'ear of corn,' was no doubt derived from the fact that it was the beginning of the harvest (cf. Dt $16^{1.\ 9}$).

(*d*) *Ziv* ('the second month' in 1 K $6^{1.\ 37}$), 'splendour,' with reference, Gesenius supposes, to the beauty of the flowers; but it might be to the general beauty of Nature at this season, before vegetation has suffered from the summer drought.

There are, besides, in Phœnician inscriptions several other names of months which are not actually found, or at any rate with this significance, in OT, but were not improbably used by the early Hebrews. Thus we have *Marpeh*, *Pha'uloth*, *Mirzah*, *Mapha'*, *Ḥir*, *Zebah-shishim*. But we have no means of ascertaining definitely to what months these names belong. On the other hand, *Abib* and *Ziv* have not yet been found on any Phœnician inscription.

B. (1) *After the Exile* the religious year, at any rate, began about the vernal equinox, or, to be more exact, with the first lunation of which the full moon fell after the vernal equinox. This was at least the intention. But very probably, with the early arrangement of intercalary months, as certainly with the more systematic adoption of definite cycles at a later time, it sometimes happened that what was regarded as the first full moon either slightly preceded the equinox or was in reality the second after the equinox. The whole cycle of feasts, according to the laws of the Priestly Code, depended on this theory. The first lunation was what had been known as *Abib* (see above). The express provision that this was to be the first month of the year (Ex 12^{2} [P], cf. 13^{4} [J]) suggests what was at the time a new departure, but came to be regarded as an ancient tradition.

It is at least possible that, through Assyrian or Babylonian influence, the custom of reckoning the year from the spring for secular purposes had come into use a little before the Exile. That it was so reckoned in the record of Jehoiakim's treatment of Jeremiah's roll (Jer 36) is evident from the fact that there was a fire in the brazier in the 9th month (v.^{22}). But this by itself is not conclusive, because the record was probably taken from a biography of Jeremiah, which may well have been written in the time of the Exile, when the new custom had come in.

(2) As a rule, the months were now, for religious purposes, designated in the order of their occurrence as the first, second, third, etc. (Gn 7^{11} [P] 8^{4} [P], Lv $23^{5ff.}$ [H], Hag 1^{1} 2^{1}, Zec $1^{1.\ 7ff.}$). With this we may compare the similar designation of the months by their numbers, by the Society of Friends. As in the latter case, the object was probably to avoid names which had a heathen association.

For civil and historical purposes the Babylonian names of the months were now adopted. Of these, 7 only are mentioned in the OT and the Apocrypha, viz.:

Nisan (1st mo.), Neh 2^{1}, Est 3^{7}.
Sivan (3rd mo.), Est 8^{9}.
Elul (6th mo.), Neh 6^{15}, 1 Mac 14^{27}.
Kislev (9th mo.), Zec 7^{1}, Neh 1^{1}, 1 Mac 4^{52}, 2 Mac $1^{9.\ 18}$ 10^{5}.
Tebeth (10th mo.), Est 2^{16}.
Shebaṭ (11th mo.), Zec 1^{7}, 1 Mac 16^{14}.
Adar (12th mo.), Ezr 6^{15}, Est $3^{7.\ 13}$ 8^{12}, 1 Mac $7^{43.\ 49}$, 2 Mac 15^{36}.

The other 5 months were: *Iyyar* (2nd mo.); *Tammūz* (4th mo.), cf. Ezk 8^{14}, where the name appears as that of a god; *Ab* (5th mo.); *Tishri* (7th mo.); *Marcheshvan* (8th mo.). It was probably not till after the destruction of the Temple by the Romans that the Babylonian names of the months were regularly employed in the religious calendar.

(3) Before the Exile, beyond the weekly festival of the Sabbath or the 7th day of the week, and the New Moon on the 1st day of the month, it is doubtful whether any sacred day or season was absolutely fixed (see FESTIVALS AND FASTS [Heb.]; cf. Dt 16 with Lv 23), unless we are to suppose that the regulations of Lv 23 [H] imply that some provisions of the kind were made at the close of the monarchy. From the Priestly Code, including H, we find that a definite religious calendar was certainly in use in the Second Temple. Thus we have, in addition to New Moons and Sabbaths, from the 14th to the 21st of the 1st month the Feasts of Passover and Unleavened Bread (Lv 23^{5-8}), including also the sheaf-offering on the 1st day of the week which fell within this period (Lv 23^{10-14}). Seven weeks after the latter, on another Sunday falling within the 3rd month, was the Feast of Weeks (Lv 23^{15-21}). In the 7th month were three important celebrations—the Feast of Trumpets on the 1st day (Lv $23^{24.\ 25}$, Nu 29^{1-6}), the Great Day of Atonement on the 10th (Lv 16. 23^{27-32}), and the Feast of Booths, 15th–22nd (Lv $23^{34-36.\ 39-43}$).

Certain other fasts, which had come to be observed during the Exile (Zec $7^{3.\ 5}$ 8^{19}), commemorating, it is said, events connected with the siege and capture of Jerusalem, were no longer enacted by law. On the other hand, some feasts were afterwards added, viz. that of Dedication, which commemorated the re-dedication of the Temple after its defilement by Antiochus Epiphanes (1 Mac 4^{59}). This lasted for 8 days from the 25th of the 9th month (Kislev). The Feast of Nicanor, on the 13th of the 12th month (Adar), was appointed to celebrate the victory of Judas over Nicanor (1 Mac 7^{49}). The Feast of Purim, on the 14th and 15th of the same month, was, so it was said, appointed to commemorate the vengeance taken by the Jews on their enemies, as recorded in the Book of Esther (9^{15-32}; but see FESTIVALS AND FASTS [Heb.]).

LITERATURE.—Schiaparelli, *Astronomy in OT*, Eng. tr., Oxf. 1905, chs. vii.-ix.; Landau, *Beiträge zur Alterthumskunde des Orients*, Leipz. 1893–1906; Cooke, *North Semitic Inscriptions*, Oxf. 1903; Dillmann, 'Ueber das Kalenderwesen der Israeliten vor dem Bab. Exil,' in *Monatsber. d. Berl. Akad. der Wissenschaften*, 1882, pp. 914–935; Muss-Arnolt, 'The Names of the Assyr.-Bab. Months and their Regents,' in *JBL* xi. [1892] 72–94, 160–176; Schürer, *GJV*^{3} i. [1901] 745 ff.; Nowack, *Lehrb. d. Heb. Arch.*, Freib. i. B., 1894, i. 214 ff.; Benzinger, *Heb. Arch.*, *ib.* 1894, p. 198 ff.; I. Abrahams, art. 'Time,' in *HDB* iv.; artt. 'Chronology,' 'Day,' 'Week,' 'Month,' 'Year,' in *EBi*; cf. also Lit. at end of art. CALENDAR (Jewish). F. H. WOODS.

CALENDAR (Indo-Chinese).—I. *ANNAM* (Cochin-China, Annam, Tongking).—The peoples of French Indo-China, as a rule, use a calendar of Indian origin, although Chinese influence (see CALENDAR [Chinese]) is clearly seen in the calendar that is peculiar to the Annamese. There are three cycles employed by the Annamese to express their dates: the duodenary cycle, or cycle of the twelve animals (ox, tiger, hare, dragon, serpent, horse, goat, monkey, hen, dog, pig, rat), which is of Turkish origin;[1] the denary cycle, the ten 'trunks'[2] of which have the names of the five elements and the five cardinal points; the repetition of the first cycle five times, combined with six repetitions of the second, makes the great cycle of sixty years.

The year is a lunar one, and is composed of twelve months of 29 and 30 days alternately, making 354 days; to this they add a thirteenth intercalary month every three or four years arbitrarily. In a period of 19 years there are therefore seven years with thirteen months.

The first month of the year has always 29 days; of melons (*qua ng.*); the eighth, the month of cinnamon (*quế ng.*); the ninth, the month of chrysanthemums (*cúc ng.*); the tenth, the month of rest (*nhàn ng.*); the eleventh, the month of the solstice (*gia ng.*); the twelfth, the month of offerings (*lạp ng.*).

The civil day begins at midnight, and contains 12 hours, each equal to two hours of our time. The last day of the month is called the 'day of darkness' (*hôi nhật*)—an allusion to the waning of the moon. The Annamese night is often measured, according to the Chinese custom, by five watches: the first begins at 7 p.m., the second at 9 p.m., the third at 11 p.m., the fourth at 1 a.m., the fifth at 3 a.m.

The farmers' calendar in Annam, as in China, has, besides the four chief seasons, twenty-four smaller intermediary seasons.

An Annamese almanac indicates, in short, the current year in the great cycle and in the other two cycles; the full, incomplete, and intercalary (if there are such) months; the day of the month, with its order in the year; the name of the one of

Name of Year.			Translation.	Year of Cycle.		
				Era of Buddha.	Great Era.	Lesser Era.
Chnàm kŏr	*Ekasàk*	(Pāli, *ekasaka*)	Year of the Pig 1	31	21	1
,, *cŭt*	*Tōsàk*	(Skr. **do-saka*)	,, ,, Rat 2	32	22	2
,, *chlau*	*Trĕisàk*	(P. *tri-saka*)	,, ,, Ox 3	33	23	3
,, *khàl*	*Cĕthvàsàk*	(S. **chatvār-saka*)	,, ,, Tiger 4	34	24	4
,, *thăs*	*Pañcasàk*	(P. *pañcha-saka*	,, ,, Hare 5	35	25	5
,, *rōñ*	*Chasàk*	(P. *cha-saka*)	,, ,, Dragon 6	36	26	6
,, *msàñ*	*Sapsàk*	(S. *sap*[*ta*]-*saka*)	,, ,, Serpent 7	37	27	7
,, *momi*	*Atthasàk*	(P. *aṭṭha-saka*)	,, ,, Horse 8	38	28	8
,, *momē*	*Nŭpsàk*	(P. *nava-saka*)	,, ,, Goat 9	39	29	9
,, *vok*	*Samrĕtthisàk*	(*samṛddhi-saka*)[3]	,, ,, Monkey 10	40	30	10
Chnàm rokà	*Ekasàk*	...	Year of the Cock 1	41	31	11
,, *cha*	*Tōsàk*	...	,, ,, Dog 2	42	32	12
,, *kŏr*	*Trĕisàk*	...	,, ,, Pig 3	43	33	13
,, *cŭt*	*Cĕthvasàk*	...	,, ,, Rat 4	44	34	14
,, *chlau*	*Pañcasàk*	...	,, ,, Ox 5	45	35	15
,, *khàl*	*Chasàk*	...	,, ,, Tiger 6	46	36	16
,, *thăs*	*Sapsàk*	...	,, ,, Hare 7	47	37	17
,, *rōñ*	*Atthasàk*	...	,, ,, Dragon 8	48	38	18
,, *msañ*	*Nŭpsàk*	...	,, ,, Serpent 9	49	39	19
,, *momi*	*Samrĕtthisàk*	...	,, ,, Horse 10	50	40	20

in the Chinese astronomical year it begins on the 22nd of December; in the civil year, it always begins between the 20th of January and the 19th of February. The month has a regular division into three decades, but this division is being gradually superseded by the European division into weeks of seven days.

As a general practice, the Annamese name their months by successive numbers from one to twelve (first month, second month, etc.). But there is another system of names, which is employed only in the literary world: the first month is always designated by the number one (*chín nguyệt*, 'first month'); the second is the month of flowers (*hoa nguyệt*); the third, the month of peaches (*đào ng.*); the fourth, the month of plums (*mŏi ng.*); the fifth, the month of cakes (*bŏ ng.*); the sixth, the month of heat (*thư' ng.*); the seventh, the month the five elements or of the twenty-eight constellations that corresponds to it; the accepted sign for lucky and unlucky days; the phases of the moon; eclipses of the sun and moon; the one of the twenty-four seasons of the year in which each month falls; the things that are permitted and forbidden on each day; and the days of civil observance. For some years now, the Chinese-Annamese almanac has also indicated the corresponding day in the European almanac.

LITERATURE.—A+B (E. Souvignet), *Variétés tonkinoises* . . ., Hanoï, 1903, 'Calendrier impérial (Hoàng lich),' pp. 217–238; L. Cadière, 'Expressions populaires [annamites] pour désigner le temps,' in *Bulletin de l'École française d'Extrême-Orient*, ii. 367.

II. *CAMBODIA.*—In Cambodia there are in use three eras of Hindu origin, and three cycles that come from China.

1. **Eras.**—There is a religious era, or 'era of the Buddha' (Khmer *prăh păt sakrāć* = Skr. *buddha-śakarāja*), dating from the death of the Buddha (543 B.C.), which is commonly used in religious writings; a political or 'great era' (Khmer *mahà sakrāć* = Skr. *mahāśakarāja*), still used in the editing of

[1] See Edouard Chavannes, 'Le Cycle turc des douze animaux,' in *Toung-pao*, series ii. vol. vii. No. 1.

[2] In accordance with Chinese ideas, the denary cycle is regarded as having ten 'heavenly trunks,' the twelve 'earthly branches' of which form the duodenary cycle.

[3] Skr. *samṛddhi* = 'completion.'

royal annals, which is the Hindu era named after *śaka* and beginning A.D. 78; a civil or 'lesser era' (Khmer *ćŏl sakrāć* = Pāli *chullasakarāja*), employed by the Khmers in everyday actions, transactions, and correspondence, which is of astronomical origin, and dates from A.D. 638.

2. Cycles.—The principal cycle is that of the twelve animals (see above, I.), with names as follows: *ćāt*, 'rat'; *ćhlau*, 'ox'; *khàl*, 'tiger'; *thăs*, 'hare'; *rŏñ*, 'dragon'; *msàñ*, 'serpent'; *momi*, 'horse'; *momē*, 'goat'; *vok*, 'monkey'; *rokà*, 'cock'; *ćha*, 'dog'; *kŏr*, 'pig.' The names of these animals are not Khmer, but seem to belong to some dialect of the south of China. This cycle, repeated five times, is combined with a secondary cycle of ten years, the years in which are distinguished by means of ordinal numbers borrowed from Pāli. In other words, the series of the twelve animal-names (the principal cycle), repeated five times in succession in the same order, gives a period of sixty years, which is divided into six decades (secondary cycles). It is the same system as the one brought by China into Annam, except that the denary cycle is not named in the same way. The foregoing table gives an idea of the composition of the Cambodian cycle.

3. Year and months.—The Cambodians have a lunar year. It contains twelve months, of 29 and 30 days alternately, with the following Indian names: (1) *ćĕt* (Skr. *chaitra*); (2) *pisàk* (Skr. *vaiśākha*); (3) *ćes* (Skr. *jyeṣṭha*); (4) *àsàth* (Skr. *āṣāḍha*); (5) *sràp* (Skr. *śrāvaṇa*); (6) *photrabŏt* (Skr. *bhādrapada*); (7) *àsŏć* (Skr. *āśvayuja*); (8) *kàtĕk* (Skr. *kārttika*); (9) *mākosĭr* (Skr. *mārgaśīrṣa*); (10) *bŏs* (Skr. *pauṣa*); (11) *mākh* (Skr. *māgha*); (12) *phàlkŭn* (Skr. *phālguna*).

The months are divided into two periods of fifteen days: the period of the waxing moon (clear fortnight), and the period of the waning moon (dark fortnight). The Buddhists of Cambodia keep the eighth and, more especially, the fifteenth day of each of these periods as holidays.

The year begins in *ćĕt* (March–April); but although the New Year festivals are celebrated in this month, it is the custom not to begin the year until the month of *pisàk* (April–May), or sometimes even *mākosĭr* (Nov.–Dec.), in memory of the death of the Buddha. As the Cambodian year has only 354 days in all, an intercalary month is inserted every three or four years by the *horas*, or royal astrologers, by doubling the month of *àsàth* (June–July); hence there is a first and a second *àsàth* (*prathomosàth*, *tŭtiyāsàth* = Skr. *prathama°*–, *dvitīya-āṣāḍha*). A period of nineteen years thus contains seven years with thirteen months.

4. Days.—The names of the days are also of Indian origin: *thñai*[1] *àtit* (Skr. *āditya*), 'Sunday'; *t. ćàn* (Skr. *chandra*), 'Monday'; *t. aṅkār* (Skr. *aṅgāraka*), 'Tuesday'; *t. pŭt* (Skr. *budha*), 'Wednesday'; *t. prahas* (Skr. *bṛhaspati*), 'Thursday'; *t. sŏk* (Skr. *śukra*), 'Friday'; *t. sau* (Skr. *śanaiśchara*), 'Saturday'; no day is a holiday in itself.

5. Hours.—The Cambodians divide the day into two parts of twelve hours each: the part from 6 a.m. to 6 p.m. is day, and that from 6 p.m. to 6 a.m. is night. In Cambodia, from 6 to 7 a.m. is 1 a.m., 7 to 8 a.m. is 2 a.m., 11 to 12 mid-day is 6 a.m., mid-day to 1 p.m. is 1 p.m., 1 to 2 p.m. is 2 p.m., 5 to 6 p.m. is 6 p.m. The hour is divided into *bàt*, each of which is equal to five minutes. The night is sometimes divided into four watches (*yām*; Skr. *yāma*, 'watch') of three hours each: the first from sunset to 9 p.m., the second from 9 p.m. to midnight, the third from midnight to 3 a.m., and the fourth from 3 a.m. till day-time, *i.e.* 6 a.m.

[1] *Thñai* = 'day.'

6. Seasons.—The Cambodians have three seasons (*rodŏv*, *khè*): (1) rainy season (*rodŏv phlīć*, *khè práh vosà* [= Pāli *vassa*]); (2) cold season (*rodŏv roñār*, *khè roṃho' i*); (3) dry or warm season (*rodŏv prăn*, *r. kdau*).

7. Almanac.—The name given to the almanac in Cambodia is *mahàsaṅkràn* (Skr. *mahāsamkrānti*, 'great transit'). The Skr. expression *saṃkrānti* is used to designate the passing of one sign of the zodiac into the next sign; as the 'great transit' is the one that marks the beginning of the new year, the derivation of the Cambodian expression is obvious.

'The *horas*, or royal astrologers, arrange the Cambodian calendar year by year. For each month it gives the relation of the days of the week to the 1st, 8th, and 15th days of the waxing moon (*ko't*), to the 1st and 8th days of the waning moon (*rŏć*), and to the last day of the month (*khè dăć*). It is followed by a public notice giving various information on the beginning of the year, and rules connected with the position of the different orders of the State, with the temperature, rain, harvests, rise of the river, prices of commodities, eclipses of the moon, and, lastly, fixing the initial day of the *vassa*, or retirement of the religious, during the rainy season.'

L. Finot (see Lit. below), from whom these details are borrowed, adds that the basis of the Cambodian almanac is Hindu, and that the very language it employs is a witness to the deep and persistent influence of Indian science.

LITERATURE.—G. Jeanneau, 'Notice sur le calendrier cambodgien,' in *Annuaire de la Cochinchine*, 1870; 'Un Almanach cambodgien,' tr. Ph. Hahn and L. Finot in *Revue Indo-Chinoise*, Hanoï, 1904, pp. 138–143; Moura, *Vocabulaire français-cambodgien et cambodgien-français*, Paris, 1878, pp. 15–17.

III. *CHAMPA.*—It is probable that in ancient times the Chams, like their neighbours the Khmers, had a calendar of Hindu origin, but they have lost it and have also completely forgotten the *śaka* era (A.D. 78) which their ancestors employed in inscriptions. Nowadays they simply use the Chinese-Annamese calendar for the needs of daily life, the only difference being that their year starts in April–May.

1. Cycles.—(1) *Sexagenary cycle.*—The Chams adopted the Chinese-Annamese sixty-year cycle.

(2) *Duodenary cycle.*—This is the cycle used for naming and calculating the years. The twelve year-names are borrowed from animals, but—a peculiarity which is worthy of remark—they are also the names employed in ordinary everyday language. The names of the twelve years are: (1) *tikuḥ*, 'rat'; (2) *kabav*, 'buffalo'; (3) *rimauṅ*, 'tiger'; (4) *tapaiy*, 'hare'; (5) *nögarai*, 'dragon'; (6) *ulā anaiḥ*, 'little serpent'; (7) *asaiḥ*, 'horse'; (8) *pabaiy*, 'goat'; (9) *krā*, 'monkey'; (10) *mönuk*, 'hen'; (11) *asău*, 'dog'; (12) *pabwĕi*, 'pig.'

(3) *Eight-year cycle.*—There is another Cham calendar[1] based on the eight-year cycle, called *windu* by the Javanese, and probably introduced into Champa by Muslmān missionaries from Java. In Java, the Javanese-Musalmān civil year is lunar, and it originated from the Indian luni-solar year; hence it differed somewhat from the real Arabian lunar year. Efforts were made to bring these years back to correspondence, and the means employed was the *windu*, or cycle of eight years. We need not enter into details here, but it may be noticed that in Java the years of the *windu* have the following Malaysian names: *alip*, *'ehē*, *jīm awal*, *jē* or *dzē*, *dāl*, *bē*, *wāu*, *jīm ahir*, and are represented by the Arabic letters: *a*, *ḥ*, *j*, *dh*, *d*, *b*, *w*, *j*[2]. The Chams have the same names slightly modified: *aliaḥ*, *hak*, *jimaval*, *ćĕi*, *dal*, *bak*, *wau*, *jimahir*, and represent them by the same letters, though sometimes substituting *h* for *ḥ*, and *z* for *dh* in their calendars, and often putting the figures 1, 4, 6, etc., meaning 1st, 4th, 6th day, under the

[1] A phototypic reproduction of a perpetual Cham calendar will be found in the present writer's article, 'Les Chams musulmans de l'Indo-Chine,' in *Revue du monde musulman*, April 1907, No. 6, p. 175.

Arabic names of the days *aḥad*, *arbā'*, *sabt*, etc., instead of writing out the days of the Cham week in full.

As the Chams combined their 12-year cycle with the *windu*, or 8-year cycle, the years in which are designated by letters, it follows that three 8-year series and two 12-year series two series was covered, in theory, by means of an embolismic year, and more simply by adopting the corrections of the Chinese-Annamese calendar.

Predictions based on coincidences of years and days, analogous to the *aṅgara-kasih*[1] of the Javanese, take place among the Chams. If, for instance, the cycles of the 'rat' and the 'pig' coincide in

TABLE of the Cham Duodenary Cycle.

Order.	Animal of Cycle.	Nature of Year.	Letter of 8-Year Cycle.	1st Day of Waxing Moon.	Seat of Year.[2]
1	Rat	full	a	*śuk* 'Friday'	forehead
		incomplete	d	*soṃ* 'Monday'	eye
2	Buffalo	full	ḥ	*aṅar* 'Tuesday'	eyebrow
		incomplete	b	*sanćar* 'Saturday'	ear
3	Tiger	full	j	*adit* 'Sunday'	mouth
		incomplete	w	*but* 'Wednesday'	nose
4	Hare	full	dh	*jip* 'Thursday'	liver
		incomplete	j²	*adit* 'Sunday'	mouth
5	Dragon	full	a	*śuk* 'Friday'	forehead
		incomplete	d	*soṃ* 'Monday'	eye
6	Serpent	full	ḥ	*aṅar* 'Tuesday'	eyebrow
		incomplete	b	*sanćar* 'Saturday'	ear
7	Horse	full	j	*adit* 'Sunday'	mouth
		incomplete	w	*but* 'Wednesday'	nose
8	Goat	full	dh	*jip* 'Thursday'	liver
		incomplete	j²	*adit* 'Sunday'	mouth
9	Monkey	full	a	*śuk* 'Friday'	forehead
		incomplete	d	*soṃ* 'Monday'	eye
10	Cock	full	ḥ	*aṅar* 'Tuesday'	eyebrow
		incomplete	b	*sanćar* 'Saturday'	ear
11	Dog	full	j	*adit* 'Sunday'	mouth
		incomplete	w	*but* 'Wednesday'	nose
12	Pig	full	dh	*jip* 'Thursday'	liver
		incomplete	j²	*adit* 'Sunday'	mouth

TABLE showing correspondence of Christian era, Musalmān era (Hijra), *śaka* era, eight-year cycle (*windu*), and twelve-year cycle.

Christian Era.	Hijra.	Śaka.	Eight-year Cycle.		Twelve-year Cycle.	
1900	1317–18	1822	4. *ćĕi*	dh	1. *tikuḥ*	'rat'
1901	1319	1823	5. *dal*	d	2. *kabav*	'buffalo'
1902	1320	1824	6. *bak*	b	3. *rimauṅ*	'tiger'
1903	1321	1825	7. *wau*	w	4. *tapaiy*	'hare'
1904	1322	1826	8. *jiṃ ahir*	j²	5. *nŏgarai*	'dragon'
1905	1323	1827	1. *aliaḥ*	a	6. *ulă anaiḥ*	'serpent'
1906	1324	1828	2. *hak*	ḥ	7. *asaiḥ*	'horse'
1907	1325	1829	3. *jiṃ aval*	j	8. *pabaiy*	'goat'
1908	1326	1830	4. *ćĕi*	dh	9. *krā,*	'monkey'
1909	1327	1831	5. *dal*	d	10. *mönuk*	'hen'
1910	1328	1832	6. *bak*	b	11. *asău*	'dog'
1911	1329–30	1833	7. *wau*	w	12. *pabwĕi*	'pig'
1912	1331	1834	8. *jiṃ ahir*	j²	1. *tikuḥ*	'rat'
1913	1332	1835	1. *aliaḥ*	a	2. *kabav*	'buffalo'
1914	1333	1836	2. *hak*	ḥ	3. *rimauṅ*	'tiger'
1915	1334	1837	3. *jiṃ aval*	j	4. *tapaiy*	'hare'
1916	1335	1838	4. *ćĕi*	dh	5. *nŏgarai*	'dragon
1917	1336	1839	5. *dal*	d	6. *ulă anaiḥ*	'serpent'
1918	1337	1840	6. *bak*	b	7. *asaiḥ*	'horse'
1919	1338	1841	7. *wau*	w	8. *pabaiy*	'goat'
1920	1339	1842	8. *jiṃ ahir*	j²	9. *krā*	'monkey'

brought round a coincidence of the first two terms of the series, namely, *tikuḥ*, 'rat,' and *aliaḥ* (=*alif*), *a*.

The discrepancy that had arisen between the

[1] A coincidence regarded as of good augury in a month is that of *aṅgara* (Skr. *aṅgāraka*), 'Tuesday,' a day of the seven days' week, with *kliwon*, the last day of the Malayo-Polynesian week. The months with no *aṅgara-kasih* are unlucky.

[2] Referring to the body of Muhammad.

year and days, there will be a great number of births that year, and flocks and herds and rice in abundance: under the opposite conditions the year will be unlucky.

2. Months.—The Cham year, whether full or incomplete, is divided into twelve lunar months; it begins in April–May. The first ten months are simply distinguished by numbers, while the last two have special names of Indian origin.

The Banī, or Musalmān, Chams borrowed the names of their lunar months from the Arabs with slight alterations. The lunar months of both peoples, which have alternately 30 days (full month) and 29 days (incomplete month), are divided into two fortnights, according as the moon is waxing or waning—the second fortnight sometimes counting fifteen, sometimes fourteen days; but, owing to complications which are not easy to explain, the days of the months of the Brāhmanist Chams do not coincide with those of the Musalmān Chams. Official documents are dated according to the days of the Annamese month.

3. Days.—The Chams have our week. The names of the seven days correspond exactly to ours, are of Sanskrit origin, and are borrowed from the planets. The Musalmān Chams, especially in Cambodia, sometimes use the names of the days of the Arabian week with modifications.

(*a*) Week of the Brāhmanist Chams: 1. *adit* (Skr. *āditya*), 'Sunday'; 2. *soṃ* (Skr. *soma*), 'Monday'; 3. *aṅar* (Skr. *aṅgāraka*), 'Tuesday'; 4. *but* (Skr. *budha*), 'Wednesday'; 5. *jip* (Skr. *jīva*), 'Thursday'; 6. *śuk* (Skr. *śukra*), 'Friday'; 7. *sanćar* (Skr. *śanaiśchara*), 'Saturday.'

(*b*) Week of the Musalmān Chams: 1. *āhat* (Arab. *al-aḥad*); 2. *össanai* (Arab. *āl-ithnain*); 3. *asalasak* (Arab. *ath-thalāsā'*); 4. *rośbaā* (Arab. *al-arbā'*); 5. *kemis* (Arab. *al-khamīs*); 6. *juṃat* (Arab. *al-jūm'a*), 'day of Assembly'; 7. *sabat*, *söttö* (Arab. *as-sabt*), 'Sabbath day.'

4. Hours.—The day is divided into twelve hours, each equal to two hours of our time. One text even says that a day and night contain eight hours (each). The hours are reckoned from the first cock-crow; those between sunset and sunrise are called 'night hours,' and correspond to the five watches of the night.

The hour again is divided into eight parts, each equal to our ¼ hour. The time is told by means of expressions like 'the cock crows'=1 a.m.; 'the cock jumps to the ground'=2 a.m.; 'the sun is risen'=6 a.m.; 'the sun is a perch above the horizon'=6.30 a.m., etc. The twelve hours of the day are also reckoned by giving each the name of one of the animals of the cycle—*tuk tikuh*, 'hour of the Rat'; *tuk kabav*, 'hour of the Buffalo'; *tuk rimauh*, 'hour of the Tiger,' etc.

[1] Cf. the Malaysian *būlan puwāsa* (=Skr. *upavāsa*), 'the month of fasting,' 'the fast of Ramaḍān'

5. Mystical speculations of the Chams concerning the calendar.—According to the mystical speculations of the Musalmān Chams, which are adopted also by the Brāhmanist Chams, each year of the cycle comes from a part of the body of Muhammad. The year of the Rat, *e.g.*, comes from the left ear, the year of the Buffalo from the left nostril, the year of the Tiger from the right ear, etc. Allāh created the year of the Serpent first of all; among the months Ramaḍān was first, among the days *juṃat*, 'Friday.' The first three days of lunation are presided over by the three favourite wives of Muhammad. The seven days of the week come from the seven parts of the Prophet's body; the first four Muhammadans—Ubakar (Abū Bakr), Umar ('Umar), Uthamön ('Uthmān), and Alī ('Alī)—are the angels of Allāh's glory and the four *imāms* of the cardinal points. The watches of the night or day are male or female. Of the hours of day the first comes from Allāh; the second from Muhammad; the third from Gabriel; the fourth from 'Alī; the fifth from Phwatimöh (Fāṭima); the sixth from Ḥasan; the seventh from Ḥusain; the eighth comes back to Allāh. The thirty days of the month come from the thirty teeth of Adam; the upper jaw is the origin of the fifteen days of the waxing moon, the lower jaw gives the fifteen days of the waning moon. Adam's other two teeth are the seats respectively of Lord Muhammad and Lord 'Alī, etc. The root of all these speculations must lie in Islām.

Months of Brāhmanist Chams.		Months of Musalmān Chams.	
1. *bulan sa*	First month.	1. *muharröṃ*	(Arab. *muḥarram*), Muḥarram.
2. *bulan dwā*	Second month.	2. *sakphwör*	(Arab. *ṣafar*), Ṣafar.
3. *bulan klău*	Third month.	3. *rabī ul aval*	(Arab. *rabī'u 'l-awwal*), Rabī' I.
4. *bulan pak*	Fourth month.	4. *rabī ul ahir*	(Arab. *rabī'u 'l-akhir*), Rabī' II.
5. *bulan limö*	Fifth month.	5. *jamödi lula*	(Arab. *jumādā 'l-ūlā*), Jumādā I.
6. *bulan naṃ*	Sixth month.	6. *jamödi ahir*	(Arab. *jumādā 'l-ukhrā*), Jumādā II.
7. *bulan tijuḥ*	Seventh month.	7. *rajap*	(Arab. *rajab*), Rajab.
8. *bulan dalapan*	Eighth month.	8. *saban*	(Arab. *sha'bān*), Sha'bān.
9. *bulan salapan*	Ninth month.	9. *ramövan*	(Arab. *ramaḍān*), Ramaḍān.
10. *bulan sapluḥ*	Tenth month.	10. *śaphwöl, sakval*	(Arab. *shauwāl*), Shawwāl.
11. *bulan pwaś*	Puaś (Skr. *pauṣa*).[1]	11. *dul kāidaḥ*	(Arab. *dhū'l-qa'da*), Dhul-qa'da.
12. *bulan mak*	Mak (Skr. *māgha*).	12. *dul huji*	(Arab. *dhū'l-ḥijja*), Dhul-ḥijja.

LITERATURE.—E. Aymonier and A. Cabaton, *Dict. čam-français*, Paris, 1906, p. xxix ff.; A. Cabaton, *Nouvelles Recherches sur les Chams*, Paris, 1901, p. 93 ff., also 'Les Chams musulmans de l'Indo-Chine française,' in *Revue du monde musulman*, vol. ii., April 1907, No. 6; E. M. Durand, 'Notes sur les Chams,' in *Bulletin de l'École française d'Extrême-Orient*, July–Dec. 1907, p. 332 ff.

IV. *LAOS.*—The Laotians have a calendar very like that of the Siamese, which is also the calendar of the Khmers, and is of Indian origin (see above, II. [Cambodia], and CALENDAR [Siamese]).

1. Eras.—These are the same as among the Siamese and the Cambodians.[1]

2. Cycles.—The Laotians give to the animals of the duodenary cycle names very like those adopted by the Siamese, and not belonging to the every-day language. The names they use to denote the years of the denary cycle are ordinal numbers from Pāli.

3. Years and months.—The Laotian year is lunar, begins in December, and contains twelve months of 29 and 30 days alternately. In a series of three years, the first has 354 days, the second has 355 days, and the third is a compensating year with thirteen months = 384 days. It is the duty

[1] Laotian, which is a Tai dialect like Siamese, bears so close a resemblance to the latter that the art. CALENDAR (Siamese) may be referred to for the technical expressions.

of the *bonzes* to arrange the calendar so that the festivals shall fall at their proper seasons, and to determine how many days the intercalary month is to have. This is done without fixed rules, and according to the necessities of the case.

The months have no special names, but are merely numbered in order from one to twelve, as in Siam. The month is divided into two periods of fifteen days; the eighth, and especially the fifteenth, day of each period of the waxing or waning moon is a holiday; hence the growing custom in Laos of reckoning by weeks.

4. Days.—These are the same as among the Siamese and Cambodians: 1. *văn* (=day) *thit* (Siam. *văn athĭt*); 2. *văn ćan* (Siam. *v. ćăn*); 3. *văn khaň* (Siam. *v. ăṅkhan*); 4. *văn phut* (Siam. *v. phŭt*); 5. *văn pătat* (Siam. *v. pra.hăt*); 6. *văn suk* (Siam. *v. sŭk*); 7. *văn sau* (Siam. *v. săo*). *Văn thit* (Sunday) always appears four times every month; a day is sometimes added and sometimes omitted, in order to make the eighth and fifteenth days of the waxing or waning moon always fall on a Sunday.

5. Hours.—The Laotians, like the Khmers and Chams, reckon their hours by dividing the day into two parts of twelve hours each: from 6 a.m. to 6 p.m. is day, and from 6 p.m. to 6 a.m. is night. Mid-day corresponds to the end of the sixth hour of the day; midnight to the end of the sixth hour of the night. This is the Siamese system; formerly the day (from sunrise to sunset) was divided into eight *niam* of 1½ hours' length, and mid-day corresponded to the fifth *niam*. A *niam* was equal to ten *bat*, or about nine minutes of our time: a *bat* was equal to ten *nathi*, and a *nathi* almost equal to five and a half seconds of European time.

LITERATURE.—*Gouvernement général de l'Indo-Chine: Notice sur le Laos français*, published at the command of Paul Doumer, Governor-General of Indo-China, by the governing staff of Laos, under the direction of Lieut.-Col. Tournier, Resident Superior, Hanoï, 1900, pp. 186–188; Pionnier, 'Notes sur la chronologie et l'astrologie au Siam et au Laos,' *Anthropos*, iii. 489–507.

V. *NORTHERN TONGKING.*—There is a mass of little known ethnic groups, more numerous than important, ranged on the borders of Tongking and China, China and Laos, and Laos and Burma, which are classed together in French Indo-China under the administration of the military territories of Tongking and, in the case of a very small portion, under that of Northern Laos. These people seem reducible to a few ethnic groups: Tibeto-Burman, South Mongolian, and Indonesian. We may mention the Tais or Pou-Tais (divided generally into white, black, and red) and Nöa-Tais; the Pou-Ön, the Yun; the Man, the Mo, the Pa-Teng, the Kö-Lao, the Lolos, etc. They all use the Chinese or Laotian calendar more or less according to locality. Alongside of, and a degree below, these mixed peoples of the frontiers of Tongking are several semi-savage groups, possibly aboriginal, called by their neighbours of Annam, Cambodia, and Laos respectively *mọi*, *phnoṅ*, or *khā*, i.e. 'savages.' These peoples, who are slowly tending to disappear, are continually being driven back into the mountains and uncultivated parts of the country by the forward progress of the more civilized races surrounding them, and have scarcely begun to be the object of serious study. They have the various names of Bahnars, Sedangs, Jarais, Kalangs, Churus, Röngaos, Bolovens, Lovés, Samrés, Pors, Kuy Dek, etc. They do not seem to have a fixed calendar; all their computation of time is oral, empirical, and purely agricultural, based on the return of the principal seasons of rain and drought, and the sowings and harvests that bring round the return of certain rites. The year is lunar, the day is divided into several parts, according to the position of the sun or to the various occupations, and the time is told by means of such expressions as 'at the first, *or* second, cock-crow,' 'sunrise,' 'sunset,' 'when children go to bed,' 'after a first sleep,' 'the time of smoking a pipe,' 'the time of cooking rice,' etc.

LITERATURE.—E. Lunet de Lajonquière, *Ethnographie du Tonkin septentrional* . . ., Paris, 1906 (an important place is given in this volume to the partly unpublished works of Commandant Bonifacy); Bonifacy, 'Les Groupes ethniques du bassin de la Rivière Noire,' in *BSAP*, 5th July 1907, and 'Monographie des Máns, Dai-Ban, Cốc ou Sù'ng,' in *Rev. indochinoise*, 1908, Nos. 84–85; Dourisboure, *Dict. bahnar-français*, Hongkong, 1889.

A CABATON.

CALENDAR (Japanese).—The Japanese have several ways of reckoning the days, months, years, and other periods. They have both solar and lunar time; Japanese, Chinese, and Occidental time; two national calendars, and several special periods; so that they have literally 'a time for everything,' and, in some cases, they are very particular to do a certain thing on 'time.' Of the two Japanese calendars, one reckons from the mythological founding of the Japanese Empire by Jimmu Tenno in 660 B.C., and is known as *kigen* (history-beginning); and the other is the system of special periods called *nengō*.

1. In the old style of reckoning, the years were named according to the twelve signs of the Chinese zodiac, taken in conjunction with the ten 'celestial stems' (*jikkan*), obtained by dividing into two parts each of the five elements (wood, fire, earth, metal, water). These elements are known in Japanese as *ki*, *hi*, *tsuchi*, *ka* (for *kane*), and *mizu*; and the subdivisions are called *e* (or *ye*) and *to*, of which the former is said to represent the active element and the latter the passive element. Rein's explanation is as follows: 'They [the Japanese] distinguish accordingly (with special Chinese signs) *ki-no-ye*, wood in general, and *ki-no-to*, worked wood; *hi-no-ye*, natural fire (of the sun, volcanoes), and *hi-no-to*, domestic fire; *tsuchi-no-ye*, raw earth, and *tsuchi-no-to*, manufactured earth; *ka-no-ye*, native metal, and *ka-no-to*, worked metal; *mizu-no-ye*, running water, and *mizu-no-to*, stagnant water.' This will all be made clear by reference to the table on p. 115.

2. The lunar year was divided into 12 months of 29 or 30 days each, and thus contained only 354 or 355 days; but this discrepancy from the solar year was made up by adding to certain years of every lunar cycle an intercalary month of varying length. An intercalated year contained 383 or 384 days. The months were named numerically, as follows:

Ichigatsu	First Moon
[or *Shōgatsu*]	[True Moon].
Nigatsu	Second Moon.
Sangatsu	Third Moon.
Shigatsu	Fourth Moon.
Gogatsu	Fifth Moon.
Rokugatsu	Sixth Moon.
Shichigatsu	Seventh Moon.
Hachigatsu	Eighth Moon.
Kugatsu	Ninth Moon.
Jūgatsu	Tenth Moon.
Jūichigatsu	Eleventh Moon.
Jūnigatsu	Twelfth Moon.

The months had also poetical, but no less practical, appellations, as follows:

1. *Mutsuki* (Social month), *Umutsuki* (Birth month), or *Taro-zuki* (Eldest-son month).
2. *Kisaragi* (Putting on new clothes).
3. *Yayoi* (Great growth).
4. *Uzuki* (Hare month), or *Mugi-aki* (Wheat harvest).
5. *Satsuki* (Early moon).
6. *Minazuki* (Waterless month [period of drought]).
7. *Fumizuki* (Rice-blooming month, or Composition month).
8. *Hatsuki* (Leafy month), or *Tsukimi-zuki* (Moon-viewing month).[1]
9. *Nagatsuki* (Long moon), or *Kikuzuki* (Chrysanthemum month).

[1] Or *Ina-agari-zuki* (Month when the rice comes up), or *Momijizuki* (Red-leaves month).

10. *Kannazuki* (Godless month),[1] or *Koharu* (Little Spring).[2]
11. *Shimotsuki* (Frost month), or *Yogetsu* (Sunny month).
12. *Shiwasu* (Finishing-up month), or *Gokugetsu* (Last moon).

The appropriateness of these names will be more evident if one bears in mind that the New Year of the lunar calendar begins from 3 to 6 weeks later than January 1.

3. The four seasons of spring, summer, autumn, and winter were recognized; and there were 24 periods[3] of 14 or 15 days each, which to a great extent indicated the weather, and which the farmer carefully followed in planning his labours. These were as follows, beginning in February, about the time of the beginning of the New Year (Old Cal.):

1. *Risshun* (Rise of Spring)	February.
2. *Usui* (Rain Water)	
3. *Keichitsu* (Awakening of Insects)	March.
4. *Shumbun* (Vernal Equinox)	
5. *Seimei* (Clear and Bright)	April.
6. *Koku-u* (Cereal Rain)	
7. *Rikka* (Rise of Summer)	May.
8. *Shōman* (Little Filling)	
9. *Bōshu* (Grain in Ear)	June.
10. *Geshi* (Summer Solstice)	
11. *Shōsho* (Little Heat)	July.
12. *Taisho* (Great Heat)	

4. In Old Japan the week was unknown; and it was not until the present era [Meiji] that the *ichiroku*, or holidays on the 'ones' and 'sixes' of each month,[4] were introduced. This was speedily abandoned for the week system, with Sunday as an official holiday, and with names adapted from the Occidental names, as follows:

Nichiyōbi[1]	(Sun-day)=Sunday.
Getsuyōbi	(Moon-day)=Monday.
Kwayōbi	(Mars-day)=Tuesday.
Suiyōbi	(Mercury-day)=Wednesday.
Mokuyōbi	(Juppiter-day)=Thursday.
Kinyōbi	(Venus-day)=Friday.
Doyōbi	(Saturn-day)=Saturday.

There was, moreover, another division of the month more or less common even at the present day. By it each month is divided into three periods, called *jun*, of about ten days, known as *jōjun*, *chūjun*, and *gejun* (upper, middle, and lower decades).

5. The days of each month were named, not only in numerical order, but also according to the sexagenary tables mentioned above in connexion with the names of the years in 'a cycle of Cathay.' And the latter names were perhaps more important than the numerical ones, because, according to these special names, a day was judged to be either lucky or unlucky for particular events.

SYNOPSIS OF THE SEXAGENARY CYCLE.

Names of the constellations in the Sinico-Japanese zodiac.	Wood.		Fire.		Earth.		Metal.		Water.		Names of our corresponding constellations.
	Ki-no.		*Hi-no.*		*Tsuchi-no.*		*Ka[ne]-no.*		*Mizu-no.*		
	e.	*to.*	*e.*	*to.*	*e.*	*to.*	*e.*	*to.*	*e.*	*to.*	
Rat (*ne[zumi]*)	1		13		25		37		49		Aries.
Ox (*ushi*)		2		14		26		38		50	Taurus.
Tiger (*tora*)	51		3		15		27		39		Gemini.
Hare (*u[sagi]*)		52		4		16		28		40	Cancer.
Dragon (*tatsu*)	41		53		5		17		29		Leo.
Serpent (*mi*) [*hebi*]		42		54		6		18		30	Virgo.
Horse (*uma*)	31		43		55		7		19		Libra.
Goat (*hitsuji*)		32		44		56		8		20	Scorpio.
Monkey (*saru*)	21		33		45		57		9		Sagittarius.
Cock (*tori*)		22		34		46		58		10	Capricornus.
Dog (*inu*)	11		23		35		47		59		Aquarius.
Boar (*i*) [*wi*]		12		24		36		48		60	Pisces.

13. *Risshū* (Rise of Autumn) } August.
14. *Shosho* (Limit of Heat) }
15. *Hakuro* (White Dew) } September.
16. *Shūbun* (Autumnal Equinox) }
17. *Kanro* (Cold Dew) } October.
18. *Sōkō* (Frost Fall) }
19. *Rittō* (Rise of Winter) } November.
20. *Shōsetsu* (Little Snow) }
21. *Taisetsu* (Great Snow) } December.
22. *Tōji* (Winter Solstice) }
23. *Shōkan* (Little Cold) } January.
24. *Daikan* (Great Cold) }

6. The hours were named both numerically and zoologically. The first plan was as follows:

Kokonotsu-doki (ninth hour)	11 p.m.–1 a.m. and 11 a.m.–1 p.m.
Yatsu-doki (eighth hour)	1–3 a.m. and p.m.
Nanatsu-doki (seventh hour)	3–5 a.m. and p.m.
Mutsu-doki (sixth hour)[2]	5–7 a.m. and p.m.
Itsutsu-doki (fifth hour)	7–9 a.m. and p.m.
Yotsu-doki (fourth hour)	9–11 a.m. and p.m.

With reference to this old-fashioned way of marking the hours, we quote further words of explanation from Chamberlain's *Things Japanese* (p. 470):

'Why, it will be asked, did they count the hours backwards? A case of Japanese topsy-turvydom, we suppose. But then why, as there were six hours, not count from six to one, instead of beginning at so arbitrary a number as nine? The reason is this: Three preliminary strokes were always struck, in order to warn people that the hour was about to be sounded. Hence, if the numbers one, two, and three had been used to denote any of the actual hours, confusion might have arisen between them and the preliminary strokes—a confusion analogous to that which, in our own still imperfect method of striking the hour, leaves us in doubt whether the single stroke we hear is half-past twelve, one o'clock, half-past one, or any other of the numerous half-hours.'

[1] The Shinto gods (*kami*), except Ebisu (god of wealth), who is deaf and does not hear the summons, were all supposed to leave the other parts of the country and to assemble in 'annual conference' in their ancestral home of Idzumo. And as the gods had thus neglected their usual business of watching over the people, it was not considered of any use to offer prayers or sacrifices, and that month was called *kami-naki-tsuki*, or *kami-na-zuki*, or *kanna-zuki*.

[2] Corresponding to 'Indian summer.'

[3] There were also 72 periods, more minute.

[4] 1st, 6th, 11th, 16th, 21st, 26th, 31st.

[1] These names are directly derived from the names of the planets.

[2] In reckoning the hours, a distinction was sometimes made between the morning and evening, as follows: *ake-mutsu* (6 a.m.) and *kure-mutsu* (6 p.m.).

We may add that this style of computation is based on multiples of 'nine' (1×9=9, 2×9=18, 3×9=27, 4×9=36, 5×9=45, 6×9=54), and in each case the 'tail' figure of the product was chosen as the name of the hour (9, 8, 7, 6, 5, 4).

The second plan, based upon the heavenly menagerie, was as follows:

1.	Hour of the Rat,	11 p.m.–1 a.m.
2.	,, ,, ,, Ox,	1–3 a.m.
3.	,, ,, ,, Tiger,	3–5 a.m.
4.	,, ,, ,, Hare,	5–7 a.m.
5.	,, ,, ,, Dragon,	7–9 a.m.
6.	,, ,, ,, Serpent,	9–11 a.m.
7.	,, ,, ,, Horse,	11 a.m.–1 p.m.
8.	,, ,, ,, Goat,	1–3 p.m.
9.	,, ,, ,, Monkey,	3–5 p.m.
10.	,, ,, ,, Cock,	5–7 p.m.
11.	,, ,, ,, Dog,	7–9 p.m.
12.	,, ,, ,, Boar,	9–11 p.m.

By both of these systems, each 'hour' was 120 minutes in length; but it was also divided into *jōkoku* and *gekoku* (upper and lower *koku*), each of which was thus equivalent to 60 minutes.

There is also a division of the *night* into watches (*kō*), five in number, as follows:

Shokō, First Watch—Fifth Hour, 7–9 p.m.
Nikō, Second Watch—Fourth Hour, 9–11 p.m.
Sankō, Third Watch—Ninth Hour, 11 p.m.–1 a.m.
Shikō, Fourth Watch—Eighth Hour, 1–3 a.m.
Gokō, Fifth Watch—Seventh Hour, 3–5 a.m.

7. Festivals and holidays demand some attention in connexion with the calendar.

The *go-sekku*, or five festivals, were, and are, carefully observed, although their dates have been changed to fit the new solar calendar. They fell on the first[1] (or, as some say, seventh) day of the first month, the third day of the third month, the fifth day of the fifth month, the seventh day of the seventh month, and the ninth day of the ninth month. They have various names, of which the most general are those made from the names of the months, such as *Shōgatsu-no-Sekku* (First Moon's Festival), etc. But these names are not so commonly used as more specific ones, which describe more or less particularly the nature of the festival. For instance, the festival of the Third Month is well known as *Jōmi-no-Sekku* (the Girls' Festival), or *Hinamatsuri* (Dolls' Festival); that of the fifth month is the famous *Tango-no-Sekku* (the Boys' Festival), or *Nobori-no-Sekku* (Banner Festival); that of the seventh month is commonly called *Tanabata-no-Sekku* (Festival of the Star Vega); while that of the ninth month is called *Chōyō-no-Sekku* (Indian Summer Festival), or *Kiku-no-Sekku* (Chrysanthemum Festival). Moreover, the Girls' Festival is also called *Momo-no-Sekku* (Peach Festival), and the Boys' Festival is called *Shōbu-no-Sekku* (Sweet Flag Festival).[2]

The national holidays are as follows:

Shihōhai	January 1.
Genji-sai	January 3.
Kōnei Tennō Sai	January 30.
Kigen-setsu	February 11.
Shunki Kōrei Sai	(about) March 21.
Jimmu Tennō Sai	April 3.
Shūki Kōrei Sai	(about) September 24.
Kanname Sai	October 17.
Tenchō-setsu	November 3.
Niiname Sai	November 23.

Shihōhai means 'four-sides-worship,' *i.e.* from the four points of the compass, or from all sides. *Genji-sai* means 'first-beginning-festival.' *Tenchō-setsu* is the Emperor's birthday. *Kigen-setsu* was originally a festival in honour of the ascension of Jimmu, the first Emperor, to the throne, and was thus the anniversary of the establishment of the Old Empire; but it is now observed also as the celebration of the promulgation of the Constitution (Feb. 11, 1889), and is thus the anniversary of the establishment of the New Empire. The *Jimmu Tennō* Festival, on April 3, is the so-called anniversary of the death of the Emperor Jimmu. The *Kanname* Festival in October celebrates the offering of first-fruits to the ancestral deities, and the *Niiname* Festival in November celebrates the tasting of those first-fruits by the Emperor. The Spring and Autumn Festivals, in March and September, are adaptations of the Buddhist equinoctial festivals of the dead, *Higan*, and are especially observed for the worship of the Imperial ancestors. The Emperor Kōmei was the father of the present Emperor, Mutsu Hito, and reigned from 1847 to 1867. The 16th of January and July were and still are special holidays for servants and apprentices. The 17th of each month is a regular holiday for Tōkyō barbers.

Another special occasion is that known as *Setsubun*, which directly marks the end of winter and indirectly the end of the year. Theoretically, the two should correspond, but they do so only once in a few years. And yet *Setsubun* is a kind of 'New Year's Eve' and is an important festival. It is the time when beans are scattered around in every house to scare away the devils, and the following formula is also supposed to be effective:

O-ni wa soto:[1] *Fuku wa uchi,*

'Out with the devils: In with good fortune.'

This is also the occasion when 'each person present eats one more [bean] than the number of the years of his age.' The food eaten then is known as *azukimeshi*, and consists of red beans mixed with rice. This was likewise eaten in olden times on the 1st, 15th, and 28th of each month, which were the 'three days' (*sanjitsu*) then regularly observed as holidays. For a fuller description of *Setsubun*, see Hearn's *Glimpses of Unfamiliar Japan*, vol. ii. pp. 498–503; and for interesting notes on the New Year's Festival, see pp. 493–498 of the same volume.

8. A few words of explanation of the system of *nengō* may be interesting. Those eras do not regularly, but only occasionally, correspond with the reigns of the Emperors, because 'a new one was chosen whenever it was deemed necessary to commemorate an auspicious or ward off a malign event.' But hereafter the era will correspond with the reign of an Emperor. The names of some of these eras are quite famous, like the Elizabethan or the Victorian Era in English history. As the first era was a time of great reforms, it is known as the Taikwa Reformation; the Engi era, in the tenth century, is celebrated for important legislation; the Genroku era, in the seventeenth century, was 'a period of great activity in various arts'; and the Tempō era, of recent days, was 'the last brilliant period of feudalism before its fall.' This name was also given to the large 8-*rin* piece coined in that era. The Wadō era, in the fourteenth century, was so named on account of the discovery of copper; and the second era, Hakuchi, commemorates a 'white pheasant' presented to the Emperor. The present era is known as Meiji, which means 'enlightened rule.' The names of these periods are formed by the various combinations, more or less appropriate, of 68 Chinese words of good omen.

9. An explanation is necessary concerning the Japanese method of reckoning, which is 'inclusive.' Moreover, in the case of ages, the computation was made from New Year's Day, which thus became a kind of national birthday, as the birthday of the individual was not considered of sufficient importance. Thus a child born on the last day of a year would be considered two years old on the first day of the next year, because he had lived in both of these years. Therefore, in case of inquiring a person's age, it would be very important to know whether the reply gave 'Japanese years' or full years. Ignorance or forgetfulness of this

[1] Originally so established in the reign of the Emperor Uda (A.D. 888–897).

[2] See also the present writer's *Japanese Floral Calendar*, and J. Conder's elaborate paper in *TASJ*, vol. xvii. pt. ii. pp. 1–96.

[1] But in shipping and express companies it is unlucky to repeat the first stanza, because *o-ni* may mean 'honourable freight,' or 'baggage.'

distinction has often led to mistakes, and quite serious ones, in the case of historical records, chronicles, and genealogical tables. The inclusive reckoning must also be carefully noted in such expressions as 'ten days ago,' 'ten days later,' 'for ten days,' etc., which may mean what Occidentals would express by 'eleven days.'

There is now, of course, considerable confusion between the old and the new calendars, of which the latter is official, but the former is popular and still observed in country districts. This confusion naturally leads to some ludicrous anachronisms. For instance, the 7th day of the 1st month (O.S.) was known as *Nanakusa* ('Seven Herbs'), because the people were wont to go out into the fields and gather seven certain kinds of vegetables for use on that day; but January 7 is too cold and too early. In some cases, however, the old day is retained, no matter whether it fits the new calendar or not.

LITERATURE.—Clement, 'Japanese Calendars,' in *TASJ*, vol. xxx. pt. 1*; Bramsen and Clement, 'Jap. Chron. Tables,' *ib.* vol. xxxvii. suppl.; Rein, *Japan*, 2 vols., Leipzig, 1881–86; Chamberlain, *Things Japanese*[5], London, 1905; Inouye, *Sketches of Tokyo Life*, Tokyo, 1897; Tamura, *Japanese Bride*, New York, 1893; Griffis, *The Mikado's Empire*[2], New York, 1883, *Honda, the Samurai*, Boston, 1890; Hearn, *Glimpses of Unfamiliar Japan*, Boston, 1894, *Japanese Miscellany*, Boston, 1901, *Shadowings*, Boston, 1900; Mrs. Harris, *Log of a Japanese Journey*, Meadville, 1891, *Official History of the Empire of Japan*, Tokyo, 1893, *The Japanese Months*, Tokyo, 1898; Hachihama, *Superstitious Japan* (in Japanese), Tokyo; Clement, *Japanese Floral Calendar*, Chicago, 1905; J. Conder, *Flowers of Japan*, Tokyo, 1892, and *Floral Art of Japan*, London, 1900; Piggott, *Garden of Japan*, London, 1892; Ginzel, *Handbuch der mathematischen und technischen Chronologie*, i., Leipzig, 1906, pp. 450–498; Lanegg, *Midzuhogusa*, iii., Leipzig, 1880, pp. 269–286; Schram, *Kalendariographische und chronologische Tafeln*, Leipzig, 1908, pp. xxvi–xxx, 239–276 (conversion tables).

ERNEST W. CLEMENT.

CALENDAR (Jewish).—1. Historical.—The Exile in Babylon had considerable effect upon the calendar used by the Jews, as upon so many other features of their religious life. It was during the Exile that they became acquainted with the names of the months which they retain to the present day, and to which a Bab. origin is actually assigned by the Talmud (Jerus. *Rōsh Hashshānā*, I. fol. 56*d*, l. 13 from bottom). Our earliest authority for these names is now the Assuan Papyri (ed. Sayce-Cowley, London, 1906), which make mention of the following months: Ab (Pap. F), Elul (A, H), Tishri (G), Kislev (B, C, D, E, J), and Shebaṭ (K). In the later discovered papyri edited by Sachau (Berlin, 1907) we find, further, Tammūz (*Document* i. l. 4. 19) and Marcheshvan (*ib.* l. 30; *ib.* ii. l. 28). Of the former group the post-exilic books of the Bible mention Elul, Kislev, and Shebaṭ, and in addition furnish the names Nisan (Neh 2^1, Est 3^7), Sivan (Est 8^9), Tebeth (2^{16}), and Adar (3^{13} etc.). But the older practice of distinguishing the months by numbers must have remained in force alongside of the new nomenclature, and accordingly we find such expressions as 'in the first month, which is the month Nisan' (Est 3^7), or simply 'in the first month' (3^{12}). This is the case likewise in 1 Mac., where we find *τοῦ μηνὸς τοῦ ἐννάτου οὗτος ὁ μὴν χασέλευ* (4^{52}), and also *τοῦ μηνὸς τοῦ πρώτου* (9^3), etc. (cf. Schürer, *GJV*[3] i. 32). A complete list of the twelve months—Iyyar being added to the foregoing names—is given in the so-called *Megillath Ta'ănith* ('Roll of Fasts'), which probably dates from the beginning of the 1st cent. A.D. (cf. Schürer, i. 745; *JE* viii. 427). The name of the 13th, or intercalary, month is first met with in the Mishna (*Mĕgillā*, i. 4; *Nĕdārim*, viii. 5), occurring there as אדר שני ('second Adar'). In the Mishna, too, the number of days in a lunar year is fixed at 354, and in a solar year at 364 (cf. esp. *Tosefta Nazir*, i. 3, ed. Zuckermandel, Pasewalk, 1880, p. 284, l. 5); but this would, of course, apply only to common years.

As regards the intercalary month, it has been maintained, especially by Mahler (cf. Schürer, i. 748, n. 2), that, as the Babylonians had an intercalary cycle of 19 years, this may well have been adopted by the Jews. But the investigations of Oppert (*ZDMG* li. 138) and Weissbach (*ib.* lv. 195) have shown the futility of the assumption.[1] The Assuan Papyri yield ample proof of the fact that at the time after the Exile no such fixed cycle was in use among the Jews, and this would appear to be true also of the Talmudic period.[2] An eight-year cycle (*oktaeteris*) is probably referred to in the Book of Enoch (74^{13-16}), and Sextus Julius Africanus (early 3rd cent.) says that both the Greeks and the Jews intercalate three extra months every eight years (cf. Poznański, *JQR* x. 156); but the statements are somewhat indefinite (Schürer, i. 751). Explicit mention of the nineteen-year cycle is first made in post-Talmudic writings (see below).

In two pseudepigrapha which date probably from Maccabæan times, viz. the Book of Enoch (*loc. cit.*) and the Book of Jubilees (ch. 6), it is assumed that the year consists of 364 days, *i.e.* 52 complete weeks.[3] In each case the reckoning is by solar years, but it is hardly likely that this method was in general use at that time. It is recorded by David b. Merwān al-Miḳmāṣ (or al-Muḳāmmeṣ), a writer of the 9th cent., that the Sadducees observed months of 30 days, *i.e.* solar months (Poznański, *REJ*, vol. l. p. 19). This testimony, however, adds the disadvantage of obscurity to that of lateness. It finds no support in Talmudic sources.

Records dating from the closing years of the Second Temple inform us that the time of new-moon was fixed on the evidence of observers who declared that they had descried the crescent in the sky. This would imply that no one knew beforehand whether the month was to have 29 days (hence called 'defective,' חסר) or 30 days ('full,' מעובר or מלא; cf. Bornstein, *op. cit.* 26 ff.). The regulation of the month was probably at first in the hands of the priests,[4] and was afterwards committed to the Sanhedrin. Similarly, a leap-year was decided upon only when required, the main factor in the question being the state of the young crops, as it was desired that the Passover

[1] Also the hypothesis that this cycle was observed in ancient Babylonia, as held by Winckler, Jeremias, and others, must be unequivocally rejected (cf. Kugler, *Sternkunde und Sterndienst in Babel*, Münster, 1907 ff., ii. 192; Ungnad, in *OLZ*, 1910, p. 66). Moreover, to judge from the data collected by Kugler (i. 212), the regular employment of a nineteen-year cycle cannot be attributed to the Babyloniana till the Seljūḳ era, by which time the influence of Greece may well have been making itself felt (see also Schürer, i. 748).

[2] In reference to the calendar of the Assuan Papyri, see Schürer and Ginzel in *Th Lxxxii.* (1907), nos. 1 and 3; Gutesman, *REJ* liii. (1907) 194; Bornstein, *The Chronological Data of the Assuan Papyri* [in Heb.], Warsaw, 1909; and Westberg, *Die bibl. Chronologie nach Flavius Josephus*, Leipzig, 1910, p. 103 ff. Belléli (*An independent Examination of the Assuan and Elephantine Aramaic Papyri*, London, 1909) assumes that the dates given in these papyri must in all respects harmonize with the cycle of either eight or nineteen years, and then, finding this to be so in neither case, he maintains that the papyri are spurious—a most preposterous conclusion. It is related in the Talmud (*Sanhedrin*, 12*a*) that Akiba (first half of 2nd cent. A.D.) reckoned three successive years as intercalary—a fact which proves the non-existence of any intercalary cycle at that time. The same thing took place among the Karaites, who relinquished the method of computing the calendar for that of observing the moon (see below), as is attested by Levi b. Yefeth (beginning of 11th cent.; cited in Pinsker, *Likḳuṭe Ḳadmoniot*, Vienna, 1860, ii. 90).

[3] According to Epstein (*REJ* xxii. 11; *Eldad ha-Dani*, 1892, p. 156 ff.), the Book of Jubilees has a twofold determination of the year: the civil, with 12 months, eight of which had each 30 days, and four 31 days; and the religious, with 13 months of 28 days. But the theory has not yet been finally confirmed.

[4] See Zuckermann, *Materialien zur Entwick. der altjüd. Zeitrechnung im Talmud* (Breslau, 1882), p. 7. This work contains a careful and exhaustive compilation of the data supplied by the Talmudic literature with reference to the method of determining both the ordinary and the intercalary month.

* From which some of the material here used is taken by permission.

should coincide with the earing of the corn (חרש האביב);[1] the intercalary month was therefore always an Adar. It was not till a later day that the position of the sun was also taken into account (תקופה, *tequfa*; cf. *Tosefta Sanh.* ii. 7). This procedure was continued after the destruction of the Temple, though we are informed that the Patriarch Gamaliel II. (*c.* 100 A.D.), when examining the first observers of the crescent moon, made use of drawings of the lunar phases (*Rōsh Hashshānā*, ii. 8). He is also said to have fixed the duration of the month at 29½ days, ⅔ of an hour, and 73 parts of an hour, but the last two terms are undoubtedly a late interpolation (cf. Schwarz, *Der jüd. Kalender*, Breslau, 1872, p. 20; Slonimski, *Yesōde ha-'Ibbūr*[3], p. 34). In course of time less and less attention was paid to the evidence of observers, and various devices of computation were increasingly resorted to, though the Patriarch and his council still continued to fix the time of new moon in the traditional way. This constituted, in fact, one of the strongest elements of cohesion amongst the Jews of the Dispersion, and, as a special prerogative of Palestine, it was most jealously guarded. An attempt made by the Babylonian Jews to free themselves in this regard from the domination of Palestine proved altogether abortive (cf. the story about Ḥananya the nephew of Joshua b. Ḥananya [1st half of 2nd cent.] in the Jerus. *Nĕdārim*, viii. 13 fol. 40 *a*, l. 30, etc.; also Bacher, *Die Agada der Tannaiten*, i.[2] [Strassburg, 1903], 385).

At first the beginning of the month was announced to the various communities by fire-signals, but, as the Samaritans and Boethusæans would sometimes deceive the watchers by false signs, the tidings were afterwards conveyed by special messengers (*Rōsh Hashshānā*, ii. 2). As the messengers, however, could not always reach the communities outside Palestine in time to announce whether new moon would fall on the 30th or the 31st of the old, these outlying groups of Jews kept on the safe side by observing their festivals both on the day appointed by the Scriptures and on the following day, the latter thereby acquiring the name יום טוב שני של גליות ('Second feast-day of the Diaspora'). The Day of Atonement, however, was celebrated on the 10th of Tishri only, and thus formed an exception to the rule (but cf. Jerus. *Ḥallā*, i. 1, fol. 57*c*, l. 14).

In the period of the Amoraim, of whom some were resident in Palestine, and others in Babylonia (3rd–5th cent.), we hear with increasing frequency of calculations and regulations for the calendar. One of the most eminent workers in this field was Samuel, 'the astronomer' (first half of the 3rd cent.), who taught in Babylonia, and who, it appears, sought to systematize the calendar, but was unable to carry out his design (Schwarz, *op. cit.* p. 32, n. 1). He is said to have drawn up a calendar available for 60 years (*Ḥullin*, 95*a*), and was the first of his nation to maintain that the year consists of 365¼ days (*'Ĕrūbin*, 56*a*), though he was still unaware of other essential principles of the calendar (*Rōsh Hashshānā*, 20*b*). One by one, however, these principles were adopted, though the general practice remained somewhat capricious in its adhesion thereto (see, *e.g.*, Zuckermann, *op. cit.* 46). One of the Palestinian Amoraim, Simon by name (*c.* 300 A.D.), speaks of 'calculators of the calendar' (אילין דמחשבין; Jerus. *Ṣukkā*, iv. 1, fol. 54*b*, l. 17; cf. Zuckermann, p. 61); while another, Huna b. Abin (middle of 4th cent.), enjoined that, in deciding upon an intercalary month, regard should be had exclusively to the position of the sun (*tequfa*; *Rōsh Hashshānā*, 21*a*), etc. Political occurrences and the constantly increasing despotism of Rome simply forced the Jews to devise a means of determining the times of new moons and feasts independently of eye-witnesses. It is even recorded that during the campaign of Gallus (from A.D. 351 onwards), who dealt very harshly with the communities in Palestine, an intercalary month was inserted after Ab instead of Adar (*Sanhedrin*, 12*a*; cf. Graetz, *Gesch. d. Juden*, 1868–78, iv. note 31). It is also stated by Jose, an Amora who lived about this time, that the Feast of Purim (celebrated on 14th Adar) must never fall upon a Sabbath or a Monday, as in that case the Day of Atonement would fall upon a Friday or a Sunday—a contingency which on many grounds was forbidden (Jerus. *Mĕgillā*, i. 2, fol. 70*b*, l. 23). By that time, therefore, the sequence of months from Adar to Tishri must have been precisely laid down. Jose is also reported to have sent a fixed order of festivals to the communities of the Diaspora (Jerus. *'Ĕrūbin*, iii. end fol. 24*c*, l. 24). These various items, however, form but the rudiments of a continuous calendar.

Such a continuous calendar, according to a tradition that goes back to Hai Gaon († 1038), was constructed by the Patriarch Hillel II. in A.D. 359 (or, according to another version, 500, though by this time the day of Patriarchs was past). But the tradition, which stands quite alone, is confronted with grave objections. Of these the following two are of special weight: (1) The supposed calendar is never referred to in the Talmud, which received its final redaction at the end of the 5th cent. A.D. Nothing whatever is said there about the length of the month or the nineteen-year cycle, or anything else of the kind. (2) It is psychologically improbable that the Patriarch would of his own initiative divest himself of his highest privilege, and likewise of his most powerful means of influence amongst the Jewish communities both in Palestine and beyond it. Moreover, from the early post-Talmudic age we have dates which cannot be reconciled with the regular calendar in use to-day.[1] In point of fact, everything goes to indicate that the calendar, like all other productions of the kind, passed through a developing series of forms, and that it assumed its final shape in the schools of the official representatives of Judaism (called Geonim) in Babylonia.[2] To the period of the Geonim, say the 7th and 8th cents., likewise belong two tractates relevant to the subject. One of these is entitled *Pirḳe de Rabbi Eliezer*, and contains almost all the elements of the modern calendar (caps. 6–8), but it shows so many instances of self-contradiction that we must assume the presence of various interpolations (cf. also Zunz, *Gottesdienstliche Vorträge*[2], 1892, p. 287 ff.). The other, *Baraitha de Samuel* (*ed. princeps*, Salonica, 1861), is wholly engaged with astronomy, and yields a single date, 776 (beginning of cap. v.; cf. below, and *JE* ii. 520), but says nothing at all about regulations for the calendar.

In the 7th and 8th cents., again, Judaism in the East was disturbed by the rise of various sects, many of which refused to recognize the existing calendar. One of its outstanding assailants was Anān b. David, the founder of Karaism (2nd half of 8th cent.), who abandoned the method of computation, as being repugnant to Scripture, and reinstated that of lunar observation (see art.

[1] Cf. the story told of Gamaliel I. (at a time, therefore, when the Temple was still in existence) in *Tosefta Sanhedrin*, ii. 6 (p. 417 f.).

[1] One such date is the year 500, and another the year 776; cf. Bornstein, מחלקת רב סעריה גאון ובן מאיר (Warsaw, 1904), p. 18.

[2] The first to indicate Babylon as the birthplace of the Jewish calendar was Th. Reinach (*REJ* xviii. 90 ff.), but the grounds on which he builds are false. Conclusive proof of the view that the continuous calendar had its origin in Babylonia during the post-Talmudic period is furnished at the earliest by the proceedings of Ben Meir (see below), the inferences therefrom having been drawn by the present writer (*JQR* x. 152 ff.), and then elaborated by Bornstein in the treatise just cited.

KARAISM). It is said, however, that in taking this step 'Anān simply wished to make a concession to the predominant power of Islām, and thus ingratiate himself with the Khalīf (cf. Poznański, *REJ* xliv. 167). He is also said to have maintained that the intercalary month might be inserted as legitimately after Shebat as after Adar (Ḳirḳisāni, *Kitāb al-'amwār*, ed. Harkavy, p. 313, l. 7; al-Bīrūni, *Chronology of Ancient Nations*, ed. Sachau, Leipzig, 1876–78, p. 59 [Arab. text] = p. 69 [Eng. tr.]). One of 'Anān's successors, Benjamin al-Nahawendi (9th cent.), states that there are two kinds of months: religious or lunar months of 29 or 30 days, which serve to fix the dates of feasts and fasts, and civil or solar months of 30 days. In order to allow for the residual five days (he ignores the odd hours altogether), he proposes that a month be intercalated every six years, so that after a cycle of 42 years (7×6) the months will again begin on the same day (cf. Poznański, *REJ* l. 19). That the 1st of the month, or the feast-day, should always coincide with the same day of the week—as would be possible only if the year contained an integral number of weeks, or 364 days—was a desideratum also of the sect of Maghāriya ('cave-dwellers'), whose period remains unascertained, and the Okbarites, whose founder, Meswi al-Okbari, lived in the latter part of the 9th cent. (*REJ, loc. cit.*). Jehuda the Persian, another heretic of that age, affirms that the Jews had always reckoned by solar months (*ib.*). The importance attached to the recognition or repudiation of the then existing calendar may be gauged by the fact that the official circles of Judaism were free to intermarry with the Isawites,[1] who actually recognized Jesus and Muhammad as prophets, but not with the Karaites, the ground of distinction being simply that the former received the calendar while the latter did not (*JQR* x. 159).

Against all these sectaries and heretics a stand was made by the Gaon Saadya b. Joseph al-Fayyūmi (892–942). In order to safeguard the existing system of calendar, he broached the remarkable theory that it was of immemorial antiquity, and that months and festivals had always been determined by calculation. He maintained that observation of the moon was introduced only in the time of Antigonus of Socho (3rd cent. B.C.), as heretics had arisen who questioned the accuracy of the calculations, and that this step was taken simply to show that calculation and observation were in perfect accord (see *REJ* xliv. 176).[2] It was an easy matter for the Karaites to quash this theory by means of data from the Talmud (cf. Poznański, *JQR* x. 271; also *The Karaite Literary Opponents of Saadiah Gaon*, London, 1908, *passim*), and the majority of Rabbinical authorities had likewise to admit that Saadya's contentions were absurd.

The last great controversy regarding the validity of the now universally recognized calendar broke out in 921. In that year, Ben Meir, a character otherwise unknown, made his appearance in Palestine, claiming to be a descendant of the Patriarchs. He sought to restore the prerogative of the Holy Land in the fixing of new moons and festivals, the means to be employed, however, being no longer observation but calculation. He proceeded to modify one of the most important regulations of the calendar. It had been laid down that, if the conjunction of sun and moon which marks the beginning of Tishri took place after noon on a particular day, the statutory beginning of that month should be transferred to the day following, and that, if the latter happened to be Sunday, Wednesday, or Friday, on none of which Tishri could legally begin (see below), a delay of two days should be made. Now, Ben Meir professed to have a tradition to the effect that the month of Tishri is to begin on the day of conjunction, save only in the case where that event takes place 642 parts of an hour after midday—the hour comprising 1080 parts (see below). On this principle the variation in fixing the months and festivals might amount to one or even two days. A case in point occurred in the years 921–923, and a cleavage between the Palestinian and the Babylonian Jews was the result. This dispute is referred to by the Karaite Sahl b. Maṣliaḥ (end of 10th cent.; see Pinsker, *Likkuṭe Ḳadmoniot*, ii. 36) and the Syrian Elia of Nisibis (*Frag. syr. u. arab. Historiker*, ed. Baethgen, Leipzig, 1884, p. 84), neither of whom, however, mentions Ben Meir by name. The Jewish exilarch of the day invoked the aid of the young but erudite Saadya al-Fayyūmi, who disputed the position of the innovator with complete success. The definite interval selected by Ben Meir, viz. 642 parts of an hour, is, no doubt, traceable to the fact that, while the Jewish calendar was based upon the meridian of Babylonia, Ben Meir and his predecessors reckoned from that of Palestine. Now, in Palestine the year began with Nisan; in Babylonia, with Tishri. But the particular new moon of Nisan which formed the starting-point of the Palestinian reckoning fell on a Wednesday at nine hours of the day and 642 parts of an hour. When this number was transferred to Babylonia the fractional part was dropped, and hence the variation introduced by Ben Meir.[1] In any case, the controversy shows that the Jewish calendar had its origin in Babylonia during the period of the Gaons; and this conclusion is abundantly confirmed by other facts, which will be further discussed below, in the systematic part. But even Ben Meir never ventured to propose a return to the method of lunar observation.

The sole adherents of the latter were the Karaites, who had reverted in all respects to the ancient practice of determining the time of new moon by observation, and intercalating a thirteenth month when required by the state of the crops, *i.e.* the ripening ears (*'Abīb*). One of the earliest of that sect, Daniel al-Ḳumisi, held, indeed, that all recourse to astronomical calculation was mere cloud-peering and star-gazing, quoting against it Dt 18[10] (Harkavy, *Studien u. Mitteilungen*, VIII. i. 189), and his example was followed by nearly all the Karaites. Only if the atmospherical conditions rendered observation impossible was it allowable to resort to approximative calculations (Heb. הקרבה, cf. Bornstein, *Chronological Data*, p. 38). Not till the 14th cent. did they accept the nineteen-year cycle, and even then only for regions far away from Palestine, such as Byzantium, the Crimea, Poland, etc. In Egypt, for instance, as late as the 17th cent., we still find the practice of intercalating a supplementary month as necessity required (cf. Gurland, *Ginze Israel*, Lyck, 1865, i. 5). But the Karaites, scattered as they were in various countries, fell into confusion in the matter, and celebrated the same festival on different days. They were thus compelled gradually to fall back upon the expedient of calculation, and to construct astronomical tables for the purpose. One of the first to draw up such tables was Elia Bashiatchi of Constantinople

[1] The founder of this sect, 'Abu 'Isā al-Isfahāni, arose *c.* 700 A.D., and adherents were still to be found in the 10th cent. (cf. Poznański, *JQR* xvi. 770).

[2] A second theory was advanced by Maimonides († 1204), viz. that the method of calculation was always known, but could be legally resorted to only if the method of observation were abandoned, *i.e.* if there should no longer be a Sanhedrin in Palestine (see Bornstein, *op. cit.* 151).

[1] The first to call attention to this matter was Bornstein in the monograph already cited. The strictures of Epstein (*Haggōren*, v., 1906, 118–142) are incompetent. Cf. also Joffe in the Heb. Encyc. *Osar Israel*, *s.v.* 'Ben Meir' (iii., New York, 1909, p. 100 ff.).

(† 1490), whose book was called *Adderet Eliyahu* (*ed. princeps*, Constantinople, 1531). A thoroughgoing reformer appeared in Isaac b. Salomo of Chufut-Kale, in the Crimea (1755–1826), who, in his *Or ha-Lebāna* (Zitomir, 1872), maintained that perpetually repeated observations were unnecessary. He takes as his starting-point the new moon of Tishri 1779, when the so-called limits of visibility, *i.e.* the sum of the elongation and the arc of vision (*arcus visionis*), amounted to 13° 7′, and makes this the minimal limit, so that the day for which that particular result is given by calculation is thereby constituted the beginning of the month. He lays it down as a necessary condition that the moon shall not set before the sun. His followers, however, have discarded even the latter provision, and, in fact, take into account only the elongation, whose minimal limit is fixed at a little over 4° (cf. Jehuda Kokizov,[1] *Binā la-Ittīm*, ii., Odessa, 1879, p. 2 ff.). Among the Karaites of the present day, accordingly, the determination of new moons and festivals depends wholly on the interval between conjunction and sunset, thus approximating—in theory—very closely to the method of the Rabbanites. In practice, however, the difference in the dating of festivals may amount to one or even two days. Nor do the modern Karaites recognize the so-called *deḥiyoth*, 'displacements' (see below).

2. System and principles.—The Jewish calendar now in use is based upon a luni-solar system. The months are lunar, but provision is made for a periodic adjustment with the solar year. This is effected by the device of intercalating a month seven times in a cycle of 19 years, viz. in the 3rd, 6th, 8th, 11th, 14th, 17th, and 19th years (see below). As in all calendars of this type, the day commences with sunset, but the calendar day is reckoned from 6 p.m., and comprises 24 successive hours. The hour is divided into 1080 *ḥalaqim*, 'parts,' the *ḥeleq* being thus equal to 3⅓ seconds. This division is presupposed in works referring to the above-mentioned controversy between Ben Meir and Saadya (A.D. 921), but its origin is assigned to the sons of Issachar, who are said to have pursued the study of astronomy.[2] The number 1080 was fixed upon probably because it has many different sets of factors (Schwarz, *op. cit.* p. 48). Now, as the days of the week are distinguished in Hebrew not by names but by ordinal numbers, any definite point of time is commonly indicated by three numbers, specifying day, hour, and *heleq* respectively. Thus, *e.g.*, 3 d. 17 h. 480 p. (Heb. ג׳ י״ז ח״ף) signifies Tuesday, 11 h. 26′ 40″ a.m. In one particular instance, viz. the so-called *tegufa* of R. Adda—to be mentioned later—the *ḥeleq* itself was divided into 76 *rega'im*.

The duration of the synodical month, *i.e.* the interval between one conjunction (*molad*) and the next, is 29 d. 12 h. 793 p. (כ״ט י״ב תשצ״ג)=29d. 12 h. 44′ 3″ 20‴. But, as the calendar month must have an integral number of days, it has either 30 days (never 31), and is then called 'full' (מלא or מעובר), or 29 (never 28), in which case it is called 'defective' (חסר). In the calendar now in use the months Nisan, Sivan, Ab, Tishri, and Shebaṭ are always full, while Iyyar, Tammūz, Elul, Ṭebeth, and Adar are always defective. Marcheshvan and Kislev may be both full or both defective; or, again, Marcheshvan may be full and Kislev defective.[3]

In order to ascertain the exact time at which a year begins, it is necessary first of all to fix the conjunction which ushers in its first month, Tishri. This again involves the selection of a definite point from which the reckoning shall proceed. Now, as the world, according to a Talmudic tradition (*Rōsh Hashshānā*, 11*a*), was created in the month of Nisan, and as the recognized era is reckoned from that event, an attempt was made to calculate the date of the conjunction which began the first Nisan of history, the result thus arrived at being 4 d. 9 h. 642 p., *i.e.* Wednesday, 3 h. 35′ 40″ after midnight. The conjunction fixing the first Tishri could then be determined in two ways. One was to calculate half a year backwards from Nisan, giving the result 2 d. 5 h. 204 p. (בהר״ד); such was the practice in Palestine, and the formula thus found is that in general use. The other method was to calculate the date of the conjunction beginning the following Tishri, with the result 6 d. 14 h. (ו״ר)—the formula used in the Bab. schools (Bornstein, *Maḥloḳet*, p. 112). The imaginary conjunction is called 'the *molad* of nothing' (*molad tohu*). Accordingly, if the conjunction of any particular month has been ascertained, it is an easy matter to fix that of the month following, as the date already known needs but to be supplemented by 29 d. 12 h. 793 p., or, as the four complete weeks may be eliminated without affecting the result, 1 d. 12 h. 793 p. (א״ב תשצ״ג), which gives what is called the 'character' of the month.

Now the year comprises 12 × 29 d. 12 h. 793 p., or 354 d. 8 h. 876 p., and a leap-year 13 × 29 d. 12 h. 793 p., or 383 d. 21 h. 589 p. But as the year, like the month, must have an integral number of days, an ordinary year has either 354 or 355 (but sometimes, as we shall see below, 353), and a leap-year 383 or 384 (sometimes also 385).[1] Hence, if the date of the conjunction of Tishri in any given year is known, we have simply to eliminate the complete weeks, *i.e.* 350—or 378—days, and then add, for a common year, 4 d. 8 h. 876 p. (ד׳ ח׳ תתע״ו), and, for a leap-year, 5 d. 21 h. 589 p. (ה׳ כ״א תקפ״ט). These two sets of numbers are called 'remainders' (יתרונות), and each forms the 'character' of its kind of year.

In order to fix the beginning of the year, *i.e.* the 1st of Tishri, the date of its conjunction must be calculated. But four possible cases may thus occur, the New Year being delayed by one or even two days. These four contingent delays (*deḥiyoth*) are as follows:

1. The New Year cannot begin on a Sunday, or a Wednesday, or a Friday (לא אד״ו ראש). The last two days were excluded because otherwise the Day of Atonement (the 10th of Tishri) would fall on a Friday or a Sunday. As early as the Talmudic period, however, the Day of Atonement, for various ceremonial reasons, was not observed on the day immediately before or after the Sabbath (*Rōsh Hashshānā*, 20*a*). The Sunday, again, was excluded because otherwise the so-called Palm-day (*Hoshāna Rabba*, the 22nd of Tishri) would also fall upon a Sunday—a concurrence likewise prohibited on ritual grounds (*Sukkā*, 43*b*).[2] In such contingencies, therefore, the New Year is transferred to the following day.

2. Similarly, the New Year must begin a day later when the conjunction takes place after 12 o'clock noon, *i.e.* after 18 hours of the calendar day, the reason being that the crescent of the new moon is not visible on that evening. A conjunction of this character is called 'old *molad*,' and the rule bearing upon it is already given in the Talmud (*Rōsh Hashshānā*, 20*a*). But, if

---

[1] A Karaite, still [1910] living (see Poznański, *Die karäische Literatur der letzten 30 Jahre*, Frankfort, 1910, p. 10).

[2] Cf., *e.g.*, the passage from the *Sefer 'Ibrōnot* given in Schwarz, p. 21, n. 2. The tradition regarding the astronomical knowledge of the sons of Issachar was derived from 1 Ch 12[32]. Saadya Gaon appealed to the same verse as an evidence of the high antiquity of the continuous Jewish calendar, and was on this account assailed by the whole Karaite school (cf. Poznański, *The Karaite Literary Opponents of Saadiah Gaon*, p. 39).

[3] We cannot well say why these two months in particular should vary in this way. It may have seemed desirable, however, to regulate exactly the months from Nisan to Tishri inclusive, so that the dates of the festivals might be easily ascertained; the irregularities could then be confined to the two months which follow immediately after Tishri.

[1] The reason for placing the limit lower in the case of the common year, and higher in that of the leap-year, was probably that the numbers 353 and 385 respectively approximate more nearly to the actual duration than do the numbers 356 and 382.

[2] The reasons for which the variation was made were thus of a ritual character in every case, as Geiger (*Jüd. Ztschr.* vi. 141 ff.) has rightly recognized. The attempts that have been made (so already Maimonides; cf. Schwarz, p. 54 ff.) to give an astronomical explanation of the variation must be regarded as too artificial.

the following day be a Sunday, a Wednesday, or a Friday, the New Year is delayed by two days.

3. If in any year following upon a common year the conjunction of Tishri takes place at or after 3 d. 9 h. 204 p. (ג׳ ט׳ ר״ך), the New Year cannot begin on that day or on the following day—Wednesday (by 1)—and in that case is delayed till Thursday. For, if 3 d. 9 h. 204 p. be added to the 'remainder' of a common year, *i.e.* 4 d. 8 h. 876 p., the result is 7 d. 18 h. As the Tishri of the following year, however, must not begin on Saturday (by 2) or Sunday (by 1), it would have to be delayed till Monday. But in that case the current year would have 356 days, which exceeds the statutory limit.

4. If the conjunction of Tishri in any year following upon a leap-year takes place at or after 2 d. 15 h. 589 p. (ב׳ ט״ו תקפ״ט), the New Year must be transferred to the Tuesday. For, if from these figures, or rather from 7 d. +2 d. 15 h. 589 p., *i.e.* 9 d. 15 h. 589 p., the 'character' of a leap-year, viz. 5 d. 21 h. 589 p., be subtracted, the result is 3 d. 18 h. The Tishri of the previous year must, therefore, have begun on a Thursday, as Tuesday is excluded by (2), and Wednesday by (1). But if the current year were made to begin on Monday, the previous (embolismic) year would have only 382 days, which falls short of the lower statutory limit.

The duration of any particular year, *i.e.* the number of days in it, may accordingly be determined as follows: Calculate the date of the conjunction of Tishri, and also of the Tishri in the year following, allow for the 4 *deḥiyoth*, and observe whether the year—if an ordinary year—has 353, 354, or 355 days, or, again—if a leap-year—whether it has 383, 384, or 385 days. If the number be 353 (or 383), the months of Marcheshvan and Kislev are both defective, and the year itself is in that case also called a 'defective' one (חסרה, abbreviated ח). If it has 354 (or 384) days, Marcheshvan is defective and Kislev full, the year being then designated as 'regular' (כסדרה, abbr. כ). Finally, if the number be 355 (or 385), Marcheshvan and Kislev are both full, and such a year is called 'complete' (שלמה, abbr. ש). Hence, as the first days of all the other months are determined on antecedent grounds, the complete sequence of festivals and seasons is now known. It is also usual to specify the day of the week on which the Passover begins, and the symbol employed is combined with symbols for New Year's Day and the length of the year in order to indicate the *qebia'* of the year. Thus, for example, the *qebia'* בחג signifies that New Year begins on Monday (ב=2nd day of week), that the year is defective (ח=חסרה, *i.e.* Marcheshvan and Kislev with 29 days each), and that the Passover begins on Tuesday (ג=3rd day of week). It may be shown without difficulty that there can be only 14 types of yearly calendars, 7 for common years, and 7 for leap-years.[1]

For common years: השן, השא, הכז, בשה, גבה, וחא, כחג.

For leap-years: השז, השו, גבו, בשו, וחג, החא, בחה.

But the *qebia'* of a year can also be determined without calculating when the ensuing Tishri shall begin. All that is necessary is to take cognizance of the extreme 'limits' (גבולים) within which the conjunction of Tishri must fall. It must then be noted whether the year is a leap-year (Group I.) or a common year; and if the latter, whether it immediately precedes (Group II.) or immediately follows (Group III.) a leap-year, or, finally, occurs between two leap-years.[1] The various items have been set forth in a table, as given below.

The use of this table may be explained by an example. The *qebia'* בח denotes a year which begins on a Monday (ב) and has 353 days (ח=חסרה, 'defective'). The earlier limit is 7 d. 18 h., for, if the conjunction takes place after 12 o'clock noon on Saturday, the New Year cannot begin on Saturday (*deḥiya* 2) or Sunday (*deḥiya* 1), but must be delayed till Monday. If the year under consideration be a common year, as, *e.g.*, in Groups II.–IV., the following year will begin after 353 days, *i.e.* on a Thursday. But this, again, is permissible only if the conjunction of the corresponding Tishri takes place at or before 5 d. 17 h. 1079 p. Now, if we subtract from this formula the 'remainder' of a common year, or 4 d. 8 h. 876 p., the result is 1 d. 9 h. 203 p. But if this 'limit' be exceeded, *i.e.* if the difference amount to 1 d. 9 h. 204 p. or more, the conjunction of the following Tishri will take place at 5 d. 18 h. In that case, however, the following year will not begin before Saturday (by *deḥiyoth* 1 and 2), *i.e.* after 355 days, and the year under consideration would then be 'complete' (ש). Its *qebia'* would thus be no longer בח, but בש. Hence the 'limits' for בח in a common year are, on one side, 7 d. 18 h., and, on the other, 1 d. 9 h. 204 p.

The term *tequfa* ('course of the sun') signifies the moment at which the sun arrives at the equinoctial or solstitial point, or, in other words, the mean beginning of one of the four seasons. Thus we have *tequfat Nisan* (beginning of spring), *tequfat Tammūz* (beginning of summer), *tequfat Tishri* (beginning of autumn), and *tequfat Ṭebeth* (beginning of winter). The interval between two *tequfoth* was fixed in the 3rd cent. A.D. by the Amora Samuel (see above) at 91 d. 7½ h., the starting-point of the enumeration being made to coincide with the beginning of Nisan, and the first *tequfa* of the series fixed exactly at 4 d. 0 h. (Tuesday, 6 o'clock p.m.), 7 d. 9 h. 642 p. (ג׳ ט׳ תרם״ב) before the conjunction of the new moon of Nisan. This interval is precisely one quarter of the Julian year. The first *tequfa*, however, moves forward every successive year by 7½ h. × 4 = 1 d. 6 h., which in 28 years amounts to 1 d. 6 h. × 28 = 5 weeks, so that, after a period of 28 years, the first *tequfa* falls on the same day of the week and at the same instant of time as before. This period was therefore called the 'solar cycle' (*maḥzōr ḥamma*) or the 'great cycle' (*maḥzōr gādōl*). Now, according to Samuel, the length of the solar year is 4 × 91 d. 7½ h., or 365¼ days. But it was observed that this did not quite agree with the astronomical facts, and accordingly we find still another *tequfa*, named after Rabbi Adda, which gives 365 d. 5 h. 997 p. 48 rg. (*ḥeleq* = 76 *rega'im*), or 365 d. 5 h. 55′ 25·44″, as the length of the year, and places the first *tequfat Nisan* only 9 h. 642 p. (ט׳ תרם״ב) before the conjunction. This corresponds very closely with the Ptolemaic year, in which the odd seconds are given sometimes as 10, sometimes as 12. But although the figures of the Rabbi Adda are nearer to the facts than those of Samuel, yet they too

QEBI'OTH.

Group.	Year of Cycle.	בח	בש	גב	הב	הש	וה	וש
I.	3. 6. 8. 11. 14. 17. 19	7 d. 18 h.	1 d. 20 h. 491 p.	2 d. 18 h.	3 d. 18 h.	4 d. 11 h. 695 p.	5 d. 18 h.	6 d. 20 h. 491 p.
II.	2. 5. 10. 13. 16	7 d. 18 h.	1 d. 9 h. 204 p.	2 d. 18 h.	3 d. 9 h. 204 p.	5 d. 9 h. 204 p.	5 d. 18 h.	6 d. 9 h. 204 p.
III.	1. 4. 9. 12. 15	7 d. 18 h.	1 d. 9 h. 204 p.	2 d. 15 h. 589 p.	3 d. 9 h. 204 p.	5 d. 9 h. 204 p.	5 d. 18 h.	6 d. 0 h. 408 p.
IV.	7. 18	7 d. 18 h.	1 d. 9 h. 204 p.	2 d. 15 h. 589 p.	3 d. 9 h. 204 p.	5 d. 9 h. 204 p.	5 d. 18 h.	6 d. 9 h. 204 p.

[1] See the detailed proof in Schwarz, p. 62 ff.

[1] These limits were at a very early date grouped in the so-called 'four gates' (*'Arba'ah She'arim*), corresponding to the four days of the week—Monday, Tuesday, Thursday, and Saturday—on which alone the New Year could begin. So far as we know, the earliest writer to apply the method was Saadya Gaon; cf. Poznański, *REJ* xl. 87, and Bornstein, *Maḥloḳet*, p. 99.

show an error, as the precise length of the year is only 365 d. 5 h. 48′ 48″.

The earliest known reference to the '*tequfa* of R. Adda' under that designation is made by Isaac b. Baruch Albalia of Cordova (A.D. 1035–1094; cf. Abraham b. Ḥiya's *Sefer ha-'Ibbūr*, iii. 4), but the period it indicates is already referred to by al-Bīrūnī (Arab. text, p. 183 = Eng. tr. p. 163). He states that, when the Jews wish to determine the year *precisely* (اذا دققوا), they reckon its length as 365 d. $5\frac{1}{4}\frac{1}{53}$ h., which corresponds exactly with the *tequfa* of R. Adda. But this *tequfa* must go still further back, as it agrees with a date (776) mentioned in the *Baraïtha* of Samuel (see above).[1] Moreover, the intercalary system in common use among the Jews, of which we shall treat presently, could never have been framed except on the basis of R. Adda's—not Samuel's—*tequfa*.[2] In all probability, therefore, its duration was calculated about the 8th cent. A.D., *i.e.* at the period in which the Jews in the East began to study astronomy, and became acquainted with the Almagest.[3]

As already indicated, the Jewish year is a composite arrangement. Its months are lunar, but from time to time an extra month is intercalated in order to effect an adjustment with the solar year. This was done even before the establishment of the continuous calendar. It was regarded as a matter of special importance that the month of Nisan should not begin before its *tequfa* (beginning of spring), and a second Adar was intercalated as required; but at that time nothing was as yet known of a regular and periodic intercalation, recurring according to definite rules. Such an arrangement was in all probability first introduced along with the continuous calendar itself, when the Metonic cycle was adopted. It had been observed that 235 lunar months are equal to 19 solar years. But, as 235 ÷ 19 gives the quotient 12, with 7 as remainder, an additional month, a second Adar, was intercalated 7 times in the period of 19 years, which was called the 'little cycle' (*maḥzōr qāṭān*). But while, according to the majority of scholars, the leap-years of both the Metonic and the Callippic system are the 2nd, 5th, 8th, 10th, 13th, 16th, and 18th years of the cycle (cf. *JQR* x. 161), in the Jewish calendar they are the 3rd, 6th, 8th, 11th, 14th, 17th, and 19th (as in the Heb. formula גו"ח (ארו"ם). The most probable explanation of the Jewish order is that the position of the heavenly bodies at the time when the intercalary system was instituted did not require the supplementary month till the 3rd year of the cycle, then the 6th, 8th, etc.; and, as has been said, exact astronomical calculations show that this sequence is in harmony with the *tequfa* of R. Adda. We have also information to the effect that there were other intercalary systems in operation, viz. בה"ו יגו"ח (2. 5. 7. 10. 13. 16. 18), ארו"ם בה"ו (1. 4. 6. 9. 12. 15. 17), and גה"ח ארו"ם (3. 5. 8. 11. 14. 16. 19). But all these are in reality forms of the normal sequence, the variation depending simply on the particular year of the cycle with which the intercalation begins. Thus, if the figures of the first formula be increased by 1, those of the second by 2, and those of the third by 3, the result in each case is the ordinary formula.[1] Hence we ought to speak, not of different intercalary series, but of different mnemonic formulæ.

The length of the year as fixed by the *tequfa* of Samuel (= the Julian year of 365¼ days) is not an exact measure of the 19-year cycle, as in that period it shows an aggregate excess of 1 h. 485 p. But even the *tequfa* of R. Adda, which was adapted to this cycle, does not fully agree with the facts, as the exact duration of the year is 365 d. 5 h. 48′ 48″, not 365 d. 5 h. 55′ 25·44″. Thus, while 235 lunar months are equivalent to 235 × 29 d. 12 h. 793 p. = 6939 d. 16 h. 595 p. = 6939 d. 16 h. 33′ 3⅓″, 19 (true) solar years amount only to 6939 d. 14 h. 27′ 12″, the former quantity being in excess by 2 h. 5′ 5⅓″. In 1000 years the cumulative error is 4·6 days, and in 2000 more than 9 days. But this discrepancy was simply left out of account.

The 'remainder' of a common year, as already stated, is 4 d. 8 h. 876 p., and that of a leap-year 5 d. 21 h. 589 p. But in the cycle of 19 years (12 common and 7 leap-years) the conjunction of the *molad* of Tishri moves forward by 2 d. 16 h. 595 p. (ב' י"ז תקצ"ה), and in 13 such cycles (13 × 2 d. 16 h. 595 p. =) 34 d. 23 h. 175 p., or by discarding the complement of full weeks, 6 d. 23 h. 175 p., which falls short of an additional week by only 905 p. Ignoring the odd parts (such fractions having in many cases no influence upon the determination of the months), we have thus a cycle of (13 × 19 =) 247 years, after which the *qebi'oth* of the years might recur. But they can never recur exactly, as it sometimes happens that even a single part (*ḥeleq*) alters the *qebia'*; thus, *e.g.*, 17 h. 1079 p. + 1 p. is a so-called 'old *molad*.'[2] An exact repetition of *qebi'oth* would ensue, in fact, only after 36288 19-year cycles, or 689472 years—a period of no practical use. A perpetual Jewish calendar that would be serviceable in any real sense is thus out of the question.

A partial approximation to such a calendar, however, is furnished by the so-called 'Table of the 61 beginnings' (לוח בעל ס"א ראשים),[3] which exhibits the *qebi'oth* of a complete 19-year cycle. As we saw above, there are 7 varieties of *qebi'oth*, and, therefore, in a cycle (7 × 19 =) 133. But in actual practice it is found that 72 of these combinations

[1] It is here stated, at the beginning of Section V., that 'sun and moon and years of release and *tequfoth* were readjusted' in A.M. 4536, and that *tequfat Tishri* (of A.M. 4537) took place on Tuesday, towards the end of the day, and 2 hrs. before the conjunction of the month of Tishri, which occurred at the beginning of Wednesday (= Tuesday, 6 p.m.). This was the 17th of September, A.D. 776. The *tequfa* of Samuel, however, fell 6 d. 11 h. later, *i.e.* on the 24th of Sept. 3 a.m. Now, if we calculate the *tequfat Nisan* of the Creation by the measurement of R. Adda, we get 4 d. 13 h., which differs from his *tequfa* by 13 h. only. This has been duly emphasized by Bornstein (*Maḥloḳet*, p. 22).

[2] As the Feast of the Passover could not take place before the beginning of the *tequfat Nisan* (beginning of spring), *i.e.* the 26th of March, then, according to Samuel's *tequfa*, an intercalary month would already be required at the end of one year, and thereafter at successive intervals of 3, 3, 2, 3, 3, 3 years. This intercalary sequence would not be the ordinary one (גו"ח ארו"ם, see below), but בה"ו יגו"ח. A similar system is found among the Samaritans, who, in fixing the Passover, take account only of the *tequfa*, and had thus, during the 16th cent., the intercalary sequence בה"ו יגו"ח.

[3] The earliest known Jewish astronomer, Mashallah, lived in the reign of the Khalif al-Manṣūr (A.D. 754–775; cf. Steinschneider, *Die arab. Literatur d. Juden*, 1902, p. 15). Here, therefore, we find a corroboration of our theory that the constant calendar of modern Judaism is of relatively late date. The calculation of conjunctions, for instance, cannot have been finally established even as late as A.D. 776, for, according to the *Baraïtha* of Samuel, the conjunction of Tishri in that year took place at 4 d. 0 h.; while, according to the modern reckoning, it did not occur till 4 d. 3 h. 363 p. This fact is of great importance in the history of the Jewish calendar (cf. Bornstein, *loc. cit.*).

[1] Such apparently dissimilar intercalary series are given by Joshua b. 'Alan (9th or 10th cent.; see the bibliography at the end), al-Bīrūnī (ed. Sachau, p. 55 [text], p. 64 [tr.]), Hai Gaon († 1038) in Abraham b. Ḥiya, p. 97, and Isaac Israeli (in an ancient *Baraïtha* in *Yesōd Olām*, iv. 2). Al-Bīrūnī says that the first two series were in use among the Jews of Palestine (اهل الشام: not of Syria, as Sachau translates), while the third was the universally received order, and emanated from the Jews of Babylonia (اهل البابل: not Babylonians, as rendered by Sachau). Cf. also *JQR* x. 197 ff.

[2] The above computation is said to have been made by the Gaon Naḥshon b. Ṣadoq (last quarter of 9th cent.), who, it is also stated, instituted a corresponding cycle, called '*Iggul*. This '*Iggul* is first mentioned by Abraham b. Ezra († 1067) (cf. *Shene ha-Meoroth*, ed. Steinschneider, Berlin, 1847, p. 1), though without the name of its originator. This is given for the first time by Joseph b. Shemtob b. Jeshu'a of Turkey, who published the '*Iggul* in his *Sheërith Josef*, a work on the calendar, composed in 1489 and issued at Salonica in 1521 (cf. Steinschneider, *Bibliotheca Mathematica*, 1894, p. 102, where mention is made also of the Lat. tr. of the '*Iggul* by Seb. Münster).

[3] First mentioned by Isaac b. Joseph Israeli in his *Yesōd Olām* (composed 1310), iv. 10.

recur, so that there remain only (133 − 72 =) 61 possible forms, which are duly calculated and set forth in tables (cf. *e.g.* Schwarz, p. 79).

There exist also formulæ and tables for synchronizing Jewish dates with the Julian and the Gregorian calendar, with which devices, however, we cannot deal here, and must simply refer to the books and tables cited at the end of this article. A formula for assimilating Jewish dates with the Muhammadan reckoning has recently been devised by A. Fränkel (*Ztschr. f. mathem. u. naturwissensch. Unterricht*, 1908, pp. 598–605; *MGWJ*, 1909, pp. 736–743).

3. Eras.—After the return from the Exile the Jews reckoned by the years of the Persian kings. This is the practice in the newly discovered papyri of Elephantine (ed. Cowley-Sayce, and also Sachau), and in the post-exilic books of the Bible (*e.g.* Hag 1^1, Zec $1^{1,7}$, Dn 9^1, Ezr 1^1 etc.). Subsequently they made use of the era of the Seljūks, or the so-called 'contracts-era' (*minyan shetaroth*), which began in the autumn of 312 B.C., and is first cited in 1 Mac. (cf. *e.g.* 1^{10}). This era was in use among the Jews in the East till the 16th cent., and is still observed by them in Yemen (cf. Saphir's 'Travels,' *Eben Sappir*, i. 62*b*). During the period of independence under the Maccabees, dates were indicated by the year of the reigning prince, and a national epoch was found in the year when Judæa gained its freedom under Simon (1 Mac 13^{42}; cf. Schürer, i.^{3} 242), *i.e.* 170 ær. Sel. = 143–142 B.C. After the Jews lost their independence and their national rulers, they probably reckoned by the years of the Roman governor or consul. The Book of Jubilees fixes its dates by jubilee periods of 49 years divided into 7 year-weeks of 7 years each, but it is unlikely that this method was ever followed in practical life. The Talmud, however, may possibly allude to such an era in *Sanhedrin*, 97*b* (cf. Isr. Lévi, *REJ* i. 110).

After the destruction of the second Temple, dates were reckoned from that event (*Le-ḥorban habayit*; cf. *Seder Olam*, cap. 30, *Abōdā Zārā*, 9–10), as also, especially in documents, by the years of the reigning Emperor, or perhaps of the eponyms (see Bornstein, *Maḥloḳet*, p. 65); both methods were in vogue in Palestine, and the former also in Southern Italy (Ascoli, *Iscrizioni inedite*, nos. 24–33). In Babylonia, on the other hand, and generally throughout the Diaspora in the East, the Jews continued to use the era of the Seljūks, which, as said above, is still observed in some districts. In the Talmud, moreover, in the tractates just cited, the era of the Creation (*Li-bri'ath 'olām*; in a later epoch it is called *Li-yeṣira*) is mentioned, but it was not used in ancient times, except, at most, in learned works (*e.g.* the *Baraitha* of Samuel), nor do we know when it was adopted. Rühl's conjecture (in *Deutsche Ztschr. für Geschichtswissenschaft*, 1898, p. 185; referred to in *JE*, *s.v.* 'Era'), that the introduction of this era was coincident with the change from the 8-year to the 19-year cycle, which is said to have taken place between A.D. 222 and 276, conflicts with the view advanced here regarding the gradual development and relatively late establishment of the continuous calendar among the Jews, and, what is more, it is at variance with historical facts, as nothing is known of this method of dating even in Talmudic times (cf. Harkavy, *Altjüd. Denkmäler aus d. Krim*, p. 161). In Europe it is first met with in epitaphs in the catacombs of Venosa, dating from 822 and 827 (Ascoli, *op. cit.*, nos. 25, 31); thereafter we find it used by Sabbataj Donnolo, also of Southern Italy, in the year 925 (cf. his *Commento sul Libro della Creazione*, ed. Castelli, p. 3); likewise in a document, of date 1034, from Kairwan (*JQR* xvi. 576). The beginning of this era coincides with the year 3760 B.C., but its accuracy was questioned in the 16th cent. by Azaria de Rossi in his *Meor Enayim* (*ed. princ.*, Mantua, 1534). The well-known Karaite Firkowitch professes to have discovered another mundane era in epitaphs from the Crimea; this begins 151 years before the ordinary Jewish era, *i.e.* in 3911 B.C., but is undoubtedly spurious (cf. Harkavy, *op. cit.* 152). An era reckoned from the captivity of Samaria, which is assumed to have begun in 596 B.C. (*Le-galuthenu*), and found in similar epitaphs, which are said to date from the years A.D. 6, 30, 55, 89, and 369 (Firkowitch, *Abne Zikkaron*, nos. 1–4 and 25), is likewise a fabrication, as is conclusively shown by Harkavy (p. 144 ff.). In recent times the Zionists also have adopted the era of *Le-galuthenu*; but in this case the term denotes the destruction of the second Temple, which they assign to A.D. 70.

LITERATURE.—A complete catalogus of works upon the Jewish calendar will be found in the relative passages of Steinschneider, 'Die Mathematik bei d. Juden' (*Bibliotheca Mathematica*, 1893–1901; *Abhandl. zur Gesch. d. Mathematik*, ix. 473–483; *MGWJ*, 1905–1907). The oldest surviving treatise is that of Joshua b. 'Alan (9th or 10th cent.), preserved in a work (ed. Harkavy, in *Haggóren*, iv. 75–79; cf. Poznański, *Ztschr. f. hebr. Bibliog.* vii. 130–131) of Ben Mashiaḥ, a Karaite (1st half of 10th cent.). The calendar was dealt with in Saadya Gaon's lost Arab. work, *Kitāb al-'ibbūr*; see, most recently, Poznański, *loc. cit.* xii. 122, no. 27, and Marx, *REJ* lviii. 299. The first complete and systematic account that has come down to us is that given in al-Bīrūnī's *Chronology of Ancient Nations* (ed. Sachau, Leipzig, 1878; Eog. tr., London, 1879), chs. vii. xiv. The earliest Jewish writer on the subject in Europe was Ḥasan ha-Dayyan of Cordova (fl. 972); three works on the calendar are attributed to him, but survive only in a few quotations. The treatise of Isaac b. Baruch ibn Albalia of Cordova (1035–1094) is also lost, but fairly large quotations therefrom are found in the work of Abraham b. Ḥiya of Barcelona (beginning of 12th cent.), whose *Sefer ha-'Ibbūr* (ed. Filipowski, London, 1851) is one of the most important on the subject. A short treatise bearing the same name was composed by Abraham ibn Ezra (1092–1167; ed. Halberstam, Lyck, 1874); Moses Maimonides (1135–1204), at the age of 23, wrote a small monograph entitled *Ma'amār ha-'Ibbūr* (*ed. princ.* 1489; Germ. by Dünner, *Die älteste astronom. Schrift d. Maimonides*, Würzburg, 1902), which, however, is of little value; but the relative section of his *Religious Code* (*Hilchoth Qiddush ha-Ḥodesh*; Germ. trs. and edd. by Hildesheimer [1881], Mahler [1889], Baneth [1898–1903]) is of eminent value. A work dealing with principles, *Yesōd Olām*, was written in 1310 by Isaac b. Joseph Israeli in Toledo (*ed. princ.*, Berlin, 1777; critical ed., Berlin, 1846–48; the section dealing with the literary history [apart], ed. Weikert, Rome, 1901). The *Sheĕrith Josef* (Salonica, 1521, 1568) of Joseph b. Shemtob b. Jeshu'a, written in 1489, has already been mentioned. The following also deserve notice: Seb. Münster, *Kalendarium Heb.* (Basel, 1537), which contains an anonymous Heb. work upon the calendar with Münster's Lat. tr.; Issachar ibn Sausan, *Tikkun Issachar* (*ed. princ.*, Constantinople, 1564); Eliezer b. Jacob Belin, *'Ibronoth* (Lublin, 1614–15), and Scaliger, *de Emendatione Temporum* (3rd [best] ed. 1629).

The following works, from the 19th cent. and later, are worthy of note: Ideler, *Handb. d. math. u. techn. Chronologie*, i. (Berlin, 1825) pp. 477–583; L. M. Lewisohn, *Gesch. u. System d. jüd. Kalenderwesens* (Leipzig, 1856); Slonimski, *Yesōde ha-'Ibbūr* (*ed. princ.*, Warsaw, 1853, 3rd [last] ed., Warsaw, 1889); A. Schwarz, *Der jüd. Kalender historisch u. astronomisch untersucht* (Breslau, 1872); J. Lurie, *Matematitcheskaja teorja jewrejskaho kalendarja* ('Mathematical Theory of the Jewish Calendar,' in Russian, Mohilev, 1887; cf. Bornstein in the *Hakkerem*, i. 317–336); S. B. Burnaby, *Elements of the Jewish and the Muhammadan Calendars* (London, 1901), pp. 1–364; Schürer, *GJV* i.^{3} (Leipzig, 1901) 745–760; C. Adler and M. Friedländer, art. 'Calendar,' in *JE* (iii. [1902] pp. 498–508); A. Kistner, *Der Kalender d. Juden* (Carlsruhe, 1905).

Tables for synchronizing Jewish dates with the Christian era, and for other purposes, as also calendars for prolonged periods, have been framed by the following: Isidore Loeb, *Tables du Calendrier juif depuis l'ère chrétienne jusqu' au xxxe siècle* (Paris, 1886), which likewise gives the older literature; Sossnitz, *'Iddān Olamim* (Warsaw, 1888); E. Mahler, *Chronol. Vergleichungstabellen*, etc., Heft ii. (Vienna, 1889) pp. 69–140; M. Simon, *200-jähriger Kalender zur Umwandlung des jüd. Datums*, etc. (for A.D. 1781–2000, Berlin, 1889), and *1200-jähriger Parallel-Kalender d. jüd. u. christl. Zeitrechnung* (for 800–1996, Berlin, 1895); B. Zuckermann, *Anleitung u. Tabellen z. Vergleichung jüd. u. christl. Zeitangaben* (Breslau, 1893); E. Jusué, *Tablas de reduccion del computo hebraico al christiano y vice-versa* (Madrid, 1904); Schram, *Kalendariographische u. chronologische Tafeln* (Leipzig, 1908), etc.

Special questions relating to the calendar and its history are dealt with by the following (names in alphabetical order): Azaria de Rossi (†1584) in *Maṣref la-Kesef* (ed. Filipowski, London, 1854); L. Bendavid, *Zur Berechnung u. Gesch. d. jüd. Kalenders* (Berlin, 1817), refutation by M. Kornick, *Dabar be-'itto* (Breslau, 1817); A. Epstein, *Mikadmoniyoth ha-Yehūdim* (i. [Vienna, 1887] 1–22, cf. Bornstein in *Hakkerem*, i. 290–317); A. Geiger in *Jüd. Ztschr.* vi. 141–151; B. Goldberg, *Note sur*

le calendrier juif (Paris, 1883); D. Oppenheim, in *MGWJ* v. 412–419; H. M. Pineles, *Darka shel Tora* (Vienna, 1861, pp. 211–262); Th. Reinach, in *REJ* xviii. 90–94; A. Schwarz, in *MGWJ* xxxii. 375–383; M. Steinschneider, in *Hayyôna* (ed. S. Sachs, i. [Berlin, 1851] pp. 17–35), and in Brann's *Jüd. Volkskalender* (1895–96); B. Zuckermann in *MGWJ* v. 182–186, etc.

SAMUEL POZNAŃSKI.

CALENDAR (Mexican and Mayan).—The ancient Mexicans and Mayas, as well as the Zapotecs, who inhabited the tract of country lying between these peoples, represented the same general type of civilization, and used a calendar essentially the same in character. We are more conversant with this calendar than with any other of their institutions; and, especially in regard to the Mexican and Mayan hieroglyphics, where it plays a commanding part as a medium of divination, it forms in reality the basis of all our knowledge. For its reconstruction we are indebted mainly to the researches of E. Seler and E. Förstemann, but we possess as yet no conclusive answers to the following vital questions: (1) To what shall we trace the *tonalamatl* (Mex. 'book of days') of 260 days, which, in conjunction with the solar year of 365 days, forms the foundation of the calendar? (2) Was provision made for intercalations in the solar year? (3) How are the dates of the Dresden Mayan MS[1] and the Mayan monuments to be adjusted to our own chronology?

1. The tonalamatl, one of the two main constituents of the calendar, consists of 260 days, reckoned by means of 20 distinct symbols of days in combination with the numbers 1 to 13. The peculiar nature of the arrangement may be learned from the accompanying table, as found in the Mexican Codex Borgia[2] and the related hieroglyphics. (For the sake of convenience the order of sequence is given here as from left to right and downwards, instead of from right to left and upwards, as in the original. The Roman numbers represent the several day-symbols.)

	Mexican.		Mayan (Yucatan).	
XIII.	Acatl	reed.	Been	worn out.
XIV.	Ocelotl	jaguar.	Ix	?
XV.	Quauhtli	eagle.	Men	maker.
XVI.	Cozcaquauhtli	great hawk (sarcorhamphus papa).	Cib	perfumery.
XVII.	Olin	motion.	Caban	what is exuded (?).
XVIII.	Tecpatl	flint.	E'tznab (E'tz)	hard (?)
XIX.	Quiauitl	rain.	Cauac	storm.
XX.	Xochitl	flower.	Ahau	king, sun.

Were we to compare the names and symbols current in Mexico with those of the other Mayan dialects, the correspondence in meaning, so far recognizable from the above lists, would be rendered clearer still.

This period of 260 days is most probably to be explained as the equivalent of nine lunar revolutions, especially as the days of the *tonalamatl* are conjoined—often continuously—with representations of nine gods, the so-called 'Lords of the night,' who may thus be regarded as the original deities of the nine lunar months; nine revolutions of the moon, however, may well represent the approximate duration of pregnancy.[1] Then, as the numerical system of these peoples was based upon 20, the number of days in a *tonalamatl* may be represented as thirteen twenties. This explanation seems more probable than any other that has been advanced. (1) The factor 13 has been derived from the period during which the moon was actually observed to wax or wane; but this would not yield a continuous reckoning, as it ignores the interlude of invisibility at new moon. (2) The number 260 has been explained as indicating the period of visibility of the planet Venus as an evening star. The actual period of visibility, however, whether as a morning or as an evening star, amounts only to some 243 days. (3) The *tonalamatl* has been derived from the fifty-two-year cycle, since

TABLE I.

1	2	3	4	5	6	7	8	9	10	11	12	13
I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII
VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX
XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	I	II	III	IV	V
XIX	XX	I	II	III	IV	V	VI	VII	VIII	IX	X	XI
V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII

1	2	3	4	5	6	7	8	9	10	11	12	13
XIV	XV	XVI	XVII	XVIII	XIX	XX	I	II	III	IV	V	VI
XX	I	II	III	IV	V	VI	VII	VIII	IX	X	XI	XII
VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII
XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	I	II	III	IV
XVIII	XIX	XX	I	II	III	IV	V	VI	VII	VIII	IX	X

1	2	3	4	5	6	7	8	9	10	11	12	13
XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	I	II	III
XVII	XVIII	XIX	XX	I	II	III	IV	V	VI	VII	VIII	IX
III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV
IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	I
XV	XVI	XVII	XVIII	XIX	XX	I	II	III	IV	V	VI	VII

1	2	3	4	5	6	7	8	9	10	11	12	13
IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV	XV	XVI
X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX	I	II
XVI	XVII	XVIII	XIX	XX	I	II	III	IV	V	VI	VII	VIII
II	III	IV	V	VI	VII	VIII	IX	X	XI	XII	XIII	XIV
VIII	IX	X	XI	XII	XIII	XIV	XV	XVI	XVII	XVIII	XIX	XX

This arrangement of five superincumbent ranks of day-symbols also preponderates in the Mayan hieroglyphics, but there the *tonalamatls* are not transcribed in full, and begin with any of the 52 columns.

The names of the day-symbols are represented in the hieroglyphics by pictures, and have come down to us in the following sequence:—

	Mexican.		Mayan (Yucatan).	
I.	Cipactli	crocodile (?).	Imlx	female breast (?).
II.	Eecatl	wind.	Ik	wind.
III.	Calli	house.	Akbal	night.
IV.	Cnetzpalin	lizard.	Kan	copious (?).
V.	Coatl	serpent.	Chicchan	biting snake.
VI.	Miquiztli	death.	Cimi	death.
VII.	Maçatl	stag.	Manik	that which hurries along.
VIII.	Tochtli	rabbit.	Lamat	?
IX.	Atl	water.	Muluc	that which is heaped up.
X.	Itzcuintli	dog.	Oc	?
XI.	Oçomatli	monkey.	Chuen	monkey.
XII.	Malinalli	a herb.	Eb	row of teeth.

[1] ed. Förstemann (2nd ed. 1892).
[2] ed. Duc de Loubat, fol. 1 f.

52 × 365 = 20 × 13 × 73. But to regard it as the subdivision of a longer period fails to do justice to its primordial character, as it forms the basis of the calculation of the solar year, and must therefore have been in force before the latter.

2. The solar year.—There was no serial enumeration of *tonalamatl* periods, and it was impossible to distinguish one *tonalamatl* from another, as the continuous representation of dates by means of cipher and symbol resulted simply in an exact repetition after every 260th day. Nor were the solar years of 365 days (Mex. *tonalpoualli*, 'numbering of days') enumerated from any particular starting-point. Nevertheless, in a prolonged succession of *tonalamatls* it came about that, during a period of 52 solar years (Mex. *xippoualli*, 'numbering of years'), a particular day of the *tonalamatl*, discriminated by a particular combination of cipher and symbol, coincided with the beginning of the year, thus rendering it possible to distinguish one year from another. As the *tonalamatl* contained 13 × 20 = 260 days, and the year had 18 × 20 + 5 = 28 × 13 + 1 = 365

[1] Zelia Nuttall, 'The Periodical Adjustments of the Ancient Mexican Calendar,' *American Anthropologist*, vi. 495, 500.

days, any given entry in the former moved forward upon the annual reckoning by five symbols and one cipher. Only 4 of the 20 symbols, therefore, coincided with New Year's Days, while the ciphers could vary 13 times; whence it follows that the *tonalamatl* provided distinctive combinations for the first days of $4 \times 13 = 52$ successive years. But the New Year's Days fell, not, as might be expected, on the days indicated by the *tonalamatl* symbols I (Cipactli), VI (Miquiztli), XI (Ocomatli), and XVI (Cozcaquauhtli), but upon XIII (Acatl), XVIII (Tecpatl), III (Calli), and VIII (Tochtli), and thus the fifty-two-year cycle may be represented as follows:

1	XIII	XVIII	III	VIII
2	XVIII	III	VIII	XIII
3	III	VIII	XIII	XVIII
4	VIII	XIII	XVIII	III
5	XIII	XVIII	III	VIII
6	XVIII	III	VIII	XIII
7	III	VIII	XIII	XVIII
8	VIII	XIII	XVIII	III
9	XIII	XVIII	III	VIII
10	XVIII	III	VIII	XIII
11	III	VIII	XIII	XVIII
12	VIII	XIII	XVIII	III
13	XIII	XVIII	III	VIII

Similarly, in the Dresden Mayan MS and the Mayan monuments the years begin in regular order with days XIII (Been), XVIII (E'tznab), III (Akbal), and VIII (Lamat), while in historical times, according to tradition, the years were reckoned in the order: IV (Kan), IX (Muluc), XIV (Ix), and XIX (Cauac).[1]

As the *tonalamatl* datings, however, were simply repeated after 260 days, and could not therefore definitely fix a particular day even *within* the year, the system was supplemented by a division of the year into 18 twenties, with 5 residual days. We give here the usual enumeration of these periods of twenty days, but it should be stated that the Mexican and the Mayan lists did not synchronize:

Mexican.	Mayan (Yucatan).
1. Atl caualo or Quauitl eua.	1. Pop.
2. Tlacaxipeualiztli.	2. Uo.
3. Toçoztontli.	3. Zip.
4. Ueitoçoztli.	4. Zo'tz.
5. Toxcatl.	5. Tzec.
6. Etzalqualiztli.	6. Xul.
7. Tecuilhuitontli.	7. Yaxkin.
8. Ueitecuilhuitl.	8. Mol.
9. Miccailhuitontli, or Tlaxochimaco.	9. Ch'en.
10. Ueimiccailhuitl, or Xocouetzi.	10. Yax.
11. Ochpaniztli.	11. Zac.
12. Teotl eco.	12. Ceh.
13. Tepeilhuitl.	13. Mac.
14. Quecholli.	14. Kankin.
15. Paoquetzaliztli.	15. Muan.
16. Atemoztli.	16. Pax.
17. Tititl.	17. Kayab.
18. Izcalli.	18. Cumku.

These 18 'months' (Mayan, *uinal*) are followed by the five residual days (Mex. *nemontemi*, 'supernumerary'; May. *xma kaba kin*, 'days without name') at the end of the year.

At the time of the conquest, according to Sahagun, the beginning of the first (Mexican) month, Atl caualo, coincided approximately with that of our February,[2] and this would harmonize with the succession of Nature-festivals assigned to the several months, and necessarily associated with the seasons of the year. The first (Mayan) month, Pop, began about the middle of our July.[3] But, as no intercalations were made—so far as known—for relatively short periods, the reckoning fell behind by one day in four years. This being duly allowed for, the statement that the Mayan year began with the 1st of Pop has been authenticated and found correct, while the earlier notices of Atl caualo as the first month of the Mexican year do not accord with our calculations. According to these, in fact, the Mexican year began with the 1st of Toxcatl,[1] *i.e.* at the beginning of May, when the sun in his northern journey passed through the zenith, and was revived by the sacrifice of his human counterpart. But if we may argue from the fact that there was among the Mayas a festival covering the five residuary days at the close of the year, that people likewise must at some earlier period have begun their year with other months, viz. Yaxkin and Pax—two dates, that is, in force at the same time, and separated from each other by 180 days.[2] Allowance having been made for the neglected intercalary days, the beginning of the Mexican year—the 1st of Toxcatl—synchronizes with our reckoning as follows:

Year 1 Acatl.....4th May 1519–1520.
Year 2 Tecpatl.....3rd May 1520–1521.
Year 3 Calli.....3rd May 1521–1522,
etc.[3]

Although, as has already been said, there is nothing to show that the calendar was adjusted by means of intercalary days, the statements of the early writers having proved to be altogether illusory, yet, as the sequence of the Nature-festivals must have corresponded with that of the months, it is absolutely certain that the discrepancy was compensated for in some way. As yet, however, the hieroglyphics have yielded no quite incontrovertible evidence to show that the Mexicans gave any theoretical recognition to the difficulty.[4] This also holds good of the *katun*-periods of the Mayas, with which we are now to deal, and in connexion with which we shall discuss the problem of synchronism in fuller detail.

3. The Katun-periods of the Mayas.—The Mexican calendar was quite inadequate for any term beyond 52 years, as after that period the characterization of dates began simply to recur, and there was no successive enumeration of the 52-year cycles. The Mayas, however, had a supplementary reckoning by means of *katun* (periods of 20×360 days), the subdivision of 360 days being called a *tun* ('stone'). These periods were designated according to the days on which they severally began, and, while this first day always coincided with the same one of the 20 day-symbols, viz. *Ahau*, its numerical coefficient increased by 11 in every successive *katun*, as $\frac{20 \times 360}{13} = 553 + 11$. It was therefore possible to discriminate 13 such periods by prefixed numerals as follows: 13 (Ahau), 11, 9, 7, 5, 3, 1, 12, 10, 8, 6, 4, and 2. Chronological references that pass beyond the resultant cycle (*c.* 13×20 years) do not merit serious regard. The calculations of Seler,[5] which are based upon the identity of 2 Ix, 1 Pop with 14th July 1543, yield the following synchronism:

Katun.	Year.	First Day of Katun.	Date of the Julian Calendar.
8 Ahau	11 Ix	7 Ch'en	29th January 1436
6 Ahau	5 Ix	7 Zo'tz	15th October 1455
4 Ahau	11 Muluc	12 Kayab	3rd July 1475
2 Ahau	5 Muluc	12 Ceh	19th March 1495
13 Ahau	12 Muluc	12 Yaxkin	5th December 1514
11 Ahau	6 Muluc	12 Uo	22nd August 1534
9 Ahau	12 Kan	17 Muan	9th May 1554
7 Ahau	6 Kan	17 Yax	24th January 1574
5 Ahau	13 Kan	17 Tzec	16th October 1593

[1] Landa, *Relacion de las cosas de Yucatan*, ed. Brasseur de Bourbourg (1864), p. 206.
[2] Sahagun, *Historia general de las cosas de Nueva España*, ed. Bustamente (Mexico, 1829), i. 50.
[3] Landa, *op. cit.* p. 276.
[1] Seler, *Gesammelte Abhandlungen*, i. 177 f. [2] *ib.* i. 703.
[3] Cf the table given by de Jonghe, 'Der altmexicanische Kalender,' in *ZE* (1906) p. 512.
[4] Seler (iii. 199 f.) has made an attempt to prove intercalations in the hieroglyphics.
[5] *Op. cit.* i. 583 f.

In the Dresden MS and upon the monuments—especially the stelæ of Copan (Honduras), Quirigua (Guatemala), and Palenque (Chiapas)—eras of still longer duration are referred to by simple enumeration of the days that had elapsed from a certain mythical date indicated by the expression 4 Ahau, 8 Cumcu. But as the terminating date that is to be fixed is likewise specified by the day of the *tonalamatl* and the year, it is plain that the sum of the simply enumerated days will represent the period lying between the termini. Here the figures carry us beyond a total of $9 \times 20 \times 20 \times 360$ days, *i.e.* more than 9×20 *katuns*, or 9 cycles, or $3550 \times 365 + 250$ days. But the dates of the monuments themselves all fall within the following or 10th cycle, and are all embraced within a span of little more than 350 years, or—if we also take into account the most extreme dates in the Leyden nephrite plinth (from the frontier of Honduras and Guatemala), which belong to the 9th cycle, and in the stele fragments from Sacchaná (Guatemala)—560 years. Unfortunately, however, this chronology cannot be brought into relation with our own, for the simple reason that, as already noted, in Yucatan during historical times the years were designated by a different series of day-symbols.

4. **The Venus-period.**—Both in Mexican and in Mayan MSS the periodic time of the planet Venus is indicated by means of the *tonalamatl* symbols and the dates of the month respectively. Leaves 46–50 of the Mayan MSS in Dresden exhibit 5 such revolutions of 584 days each, which, corresponding approximately to the sum of the two periods of visibility and the intermediate intervals, are severally divided into stages of 90, 250, 8, and 236 days.[1] In the Codex Borgia, foll. 53–4, however, there is noted, along with other Venus-periods, one of $5 \times 13 = 65$ revolutions.[2] Now 5 revolutions amount to $5 \times 584 = 8 \times 365$ days; and 65 revolutions to $65 \times 584 = 2 \times 52 \times 365$ days, *i.e.* twice the Mexican cycle of 52 years. Then, as $\frac{584}{20} = 29 + 4$, and $\frac{584}{13} = 44 + 12$, the symbol and cipher of the *tonalamatl* move forward upon each successive revolution of Venus by 4 and 12 days respectively, so that the first day of each revolution will recurrently coincide with only 5 of the 20 day-symbols, thus:

THE 65 VENUS-PERIODS.

1	I	XIII	V	XVII	IX
13	V	XVII	IX	I	XIII
12	IX	I	XIII	V	XVII
11	XIII	V	XVII	IX	I
10	XVII	IX	I	XIII	V
9	I	XIII	V	XVII	IX
8	V	XVII	IX	I	XIII
7	IX	I	XIII	V	XVII
6	XIII	V	XVII	IX	I
5	XVII	IX	I	XIII	V
4	I	XIII	V	XVII	IX
3	V	XVII	IX	I	XIII
2	IX	I	XIII	V	XVII

The Venus-period, however, was not used for determining dates.

LITERATURE.—E. Förstemann, *Erläuterungen zur Mayahandschrift der kgl. öffentl. Bibl. zu Dresden* (1886), also *Zur Entzifferung der Mayahandschriften*, i.–v. (Dresden, 1887–95); E. Seler, *Gesammelte Abhandlungen* (Berlin), i. (1902) pp. 162, 417, 507, 577, 583, 600, 618, 668, 712, 792, iii. (1908) p. 199; Cyrus Thomas, 'The Maya Year,' *18 Bull. BE* (1894), and 'Mayan Calendar Systems,' *19* and *22 RBEW* (1900, 1903); Zelia Nuttall, 'The Periodical Adjustments of the Ancient Mexican Calendar,' in *American Anthropologist*, vi. (1904) 486; Goodman, *The Archaic Maya Inscriptions* (1897), in Maudsley, *Biologia Centrali-Americana*, viii.; de Jonghe, 'Der altmexicanische Kalender,' in *ZE* xxxviii. (Berlin, 1906) p. 485; Brinton, *Native Cal. of Cent. Amer. and Mexico* (Philadelphia, 1893).

K. TH. PREUSS.

[1] Förstemann, *Erläuterungen zur Mayahandschrift der kgl. öffentl. Bibl. zu Dresden* (1886), p. 652.

[2] Given also in the allied Codex Vaticanus, No. 3773, foll. 80–84.

CALENDAR (Muslim).—Although the era of Islām begins with the 15th (16th) of July A.D. 622 (Buḥāri, iv. 248 f.), the lunar year, peculiar to the Muslims, was not established till the year A.H. 10. When Muhammad in that year (A.D. 631) made his last pilgrimage to Mecca (*ḥijjat-al-wadā'*), and in a solemn address (*ḫuṭba*) enlightened his following of believers concerning the essentials of Islām, he arranged, among other matters, that the year should consist of 12 lunar months of 29 (28, 30) days each, and that intercalation (*nasī'*) was to be forbidden (Qur'ān, ix. 36 ff.; Ibn Hishām, p. 968; Vakidi-Wellhausen, p. 431; Buḥāri, ii. 212, 9 f.). Four months, Dhū-l-qa'da, Dhū-l-ḥijja, Muḥarram, and Rajab, were to be inviolable (*ḥurum*), *i.e.* were not to be disturbed by internecine warfare (Qur'ān, ix. 36; Buḥāri, vi. 224, 3 f.). It is evident from this arrangement alone that the Arabs, or, more accurately, the Meccans, had had a more or less perfect solar year. This assumption finds support also in the names of the months, which in part indicate clearly certain definite seasons of the year—a situation, in the case of a changeable lunar year, evidently out of the question. If we take the etymology of the names together with historical, literary, and climatic data, we shall have the following arrangement of the pre-Islāmic year:

The two *Jumādā* months indicate the real winter, from about the middle of Dec. till the middle of Feb. Then the two *Rabī'* months, which signify etymologically the *grazing* season, must indicate the time of year when the herbage of the desert and the steppes, springing up after the autumn rains, affords the herds of the nomads a glorious relief from the summer's discomforts; *i.e.* from the middle of Oct. to the middle of Dec. In agreement with this, the month *Ṣafar* (Sept.-Oct.) is the transition from the height of summer to autumn. The preceding month, with which the year begins, reveals its character in its name *al-Muḥarram*; it is the *sacred* month, in pre-Islāmic times sacred perhaps on account of the harvest and the vintage, with which the Hebrews (Ex 23^{16} 34^{22}) also connected a festival. Instead of *Muḥarram-Ṣafar*, one may also say 'the two Ṣafars'; so that for the first half of the year we have not 6 months, but 3 double months. Proceeding from *Jumādā*, the etymologically obscure months *Rajab*, *Sha'bān*, and *Shawwāl* must include, respectively, Feb.-March, March-Apr., and May-June. *Ramaḍān*, suggesting *heat*, indicates the coming of the warmth of summer (April-May). The month *Rajab* was, before Islām, and has remained in Islām, a holy month. Perhaps the original reason for this is that it designated the springtime and the firstborn. Ewald and W. Robertson Smith were right in seeing in it a parallel to the Hebrew *pesaḥ*; *Rajab* and *Sha'bān* together are called also *ar-Rajabāni*. The names of the two last months, *Dhū-l-qa'da* and *Dhū-l-ḥijja*, indicate the time of rest and of pilgrimage. The Islāmic festival of sacrifices is celebrated in the latter month (cf. FESTIVALS [Muslim]). The pagan festival that lies at the basis of it had probably some solar significance. This is indicated by the Islāmic name (*aḍḥā*, etc.), which in itself has nothing to do with the sacrificial animal, and also by the part which the *Shaiṭān* plays in it, for *shaiṭān* meant originally the heat of the sun (√*shyṭ*), though in Islām it became identified with Satan. It is important to note that the Arabs, like the Hebrews, began their year in autumn and always celebrated spring and autumn festivals.

Besides the above-mentioned names of months, there have come down to us also some archaic ones which have a local significance; cf. Lane's *Lex.*, 1863–89, iv. 1612^{b}, *s.v.* 'Shahr'; Ideler, *Handbuch der Chronologie*, ii. 495 (following Golius). In Islām such names of months as are not distinguished by I or II usually received pious epithets, as: *al-Muḥarram al-ḥaram*;

Safar al-ḫair, 'the bringer of good,' euphemistically, because it was held to be the month of ill-luck; *Rajab al-fard*, 'the isolated,' because it stood apart from the other holy months, or *R. al-aṣamm*, 'the deaf,' because it heard no clash of arms (?); *Sha'bān al-mu'aẓẓam* or *ash-sharīf*; *Shawwāl al-mukarram*. The names used in the Maghrib (western North Africa) differ from those elsewhere, in that the months there are named after the Islāmic festivals: 'Āshūrā = Muḥarram; Shāye' 'Āshūrā = Ṣafar; al-Mūlūd = Rabī' I; Shāye' al-M. = R. II; 'Id al-Fiṭr = Shawwāl; Bain al-a'yād (between the Festivals) = Dhū-l-qa'da; al-'Id al-Kabīr = Dhū-l-ḥijja. It is noteworthy that the custom of reckoning three double months in the first half of the year (see above) has been there preserved.

The Arabs adopted the week (cf. FESTIVALS [Muslim]) from the Jews and Christians. Besides archaic names for the days of the week, they generally use the designations that are current in the Christian Church (F. Rühl, *Chronologie*, p. 58); *i.e.* from Monday to Thursday = days II–V; Sunday = I; Friday is called *al-jum'a*, 'the meeting' (for worship); Saturday = *as-sabt*, the Sabbath.

Moreover, the Arabs had and still have more general designations for the seasons, based on the constellations, rain, and temperature. But these names change according to the country and the climate (cf. Lane's *Lex.* iii. 1254, *s.v.* 'Zaman'; A. Socin, *Dīwān*, 1900, i. 291).

If what has been said above makes it quite certain that the Arabs once knew a solar year, it is just as indubitable that they originally and locally followed the lunar reckoning down to the time of Islām. The old Hebrew custom, as well as the traces of moon-worship among all the Semites, makes this quite probable. Especially may be cited the ritual expressions *hallala*, *ahalla* (Heb. *hillēl*, 'to praise' [God]), which is explained by *hilāl*, 'new moon,' 'crescent.' Moreover, Muḥammad could not have ventured to establish an institution of such weighty consequences if he had not found a popular basis for it. There has been much speculation as to the reasons why this step was taken by him. These can hardly have been other than religious. As we have seen, the heathen festivals were connected with the solar year. Further, the nomadic Arabs observed the stars closely, and explained natural phenomena by their influence. Through a radical separation from these conditions, Muḥammad wished to draw the believers away from Nature to his God (Allāh) as the creator, causer, and preserver of all things (*Lisān al-'Arab*, i. 172, *s.v.* 'Nau'). While the Christian Church did not succeed in doing away with the 1st of January as the beginning of the year, which day it condemned as 'antiquus error,' Muḥammad accomplished this, although with disastrous consequences. So patent are the evils of a purely lunar year whose length varies (cf. FESTIVALS [Muslim]), owing to primitive methods of observation and determination of the new moon, that efforts to correct them have never ceased from the beginning to the present day.

Apart from the determination of the times of prayer, there lies in this the main cause why astronomy so flourished among the Muslim peoples. The festivals, which have thus been detached from their natural bases, run now through all the seasons of the year; and in about 33 solar years the Arabic year returns to its starting-point. The era was formed by Friday (Thursday) the 16th (15th) of July, 622 A.D., *i.e.* the 1st of Muḥarram of the year in which Muḥammad finished his *Hijra* (emigration) from Mecca to Medina. Of this beginning Ideler says: 'The 15th is to be accepted when it is a matter of astronomical observations, but the 16th when it is a matter of bringing about an agreement between the cyclic reckoning, the appearance of the moon, and the popular Arabian calendar.' A new month begins when two trustworthy Muslims have observed (*ar-ru'yā*) the crescent moon (*hilāl*) in open field or on mountains and notify this to the authorities, the Ḥākim or the Qādī. The day is reckoned from one sunset (*maghrib*) to another. The days of the month are counted either consecutively or in the same way as in the mediæval *consuetudo Bononiensis*, which took its origin in upper Italy in the 8th cent. A.D. and spread from there to France and Germany (cf. Du Cange, *Glossarium*, *s.v.* 'Mensis'; Rühl, *Chronologie*, p. 75 f.; Wright, *Arab. Gram.*[3], 1875, ii. § 111; Caspari, *Arab. Gram.*[3], 1887, § 476).

As a remedy for the vague duration of the purely popular lunar year of the Muslims, the astronomers have established a cyclic year, which has been adopted also by historians. The months are reckoned alternately as 30 and 29 days. The ordinary year contains 354 days. The intercalation, which in pre-Islāmic times was attended to by the Fuqaim, a clan of Kināna, is now carried out in the following fashion: In a cycle of 30 years, the years 2, 5, 7, 10, 13, 16 (15), 18, 21, 24, 26, 29 add a day to their last month. Such a year is called *sana kabīsa*, but the common year *sana basīṭa*. As in this case scholars, so also many enlightened rulers of Islām, endeavoured, in the face of the prohibition of the Prophet, to substitute for the purely lunar year a solar year that would meet better the needs of the peasantry, the collecting of taxes, and the administration of the State. In this connexion may be mentioned the efforts of the Fāṭimid al-'Azīz, about 366 A.H., whose reform lasted until 501; further, the efforts of the 'Abbāsid Khalīf aṭ-Ṭā'i' (ruling 363–381 A.H.), whose reform continued even under the Ottomans; of the Seljūq Malik Shāh, about 471 A.H., who reformed the old Persian calendar with the help of the well-known poet 'Omar Ḫayyām and other astronomers; several attempts under the Il-Ḫāns, the Persian Mongols, and the partial reform by the Ottoman Government in the 19th century. In Egypt, at present, the Gregorian calendar is used for non-religious purposes. Frequent use is also made of the Coptic calendar in Egypt, and of the old Greek calendar in Syria. Among the Berbers of the Maghrib the Julian names of the months have remained in use down to the present day.

Since the 18th cent. efforts have been made to prepare for scholarly purposes a concordance of the Islāmic and European chronologies. It was after an attempt in *L'Art de vérifier les dates* (1821–44) that Ideler first fixed astronomically the relation between the two systems. The tables published by Wüstenfeld in 1854, and the numerous reprints of them, make a knowledge of Islāmic lunar dates accessible now to all. The Genevan physicist and numismatist Fr. Soret has laid down a very handy formula for converting the one date into the other (*Lettres sur la numismatique musulmane*, 1864, p. 34 ff.): Given the year of the Hijra (A), if we wish to know the Christian year (X) the formula is $A - \frac{3\,A}{100} + 622 = X$.

LITERATURE. — On the old Arabic calendar and the Islāmic reform of it: Caussin de Perceval, 'Mémoire sur le Calendrier arabe avant l'islamisme,' *JA*, 1843, i. 342–379; Mahmud Efendi (al-Falaki), 'Sur le Cal. arab.,' *JA*, 1858, i. 109–192; A. Sprenger, 'Über den Kalender der Araber vor Mohammad,' *ZDMG* xiii. (1852), 134–175; J. Wellhausen, *Reste arab. Heidentums*[2] (1897), p. 94 ff., cf. *Skizzen u. Vorarbeiten*, 1899, iii.

On the conversion of dates: F. Wüstenfeld, *Vergleichungstabellen der Muham. u. Christl. Zeitrechnung*, 1854; a continuation (1300–1500 A.H.) by Ed. Mahler, 1887; *Catal. of Orient. Coins in the Brit. Mus.* ix. 391–405; Mas Latrie, *Trésor de Chronologie*, 1889 ff.; R. Schram, *Kalendar. und chronol. Tafeln*, 1908, pp. 283–319; E. Jusué, *Tablas de Reduccion del Computo Musulman al Christiano*, Madrid, 1903; A. M. Laredo, *Rapports entre les dates du cal. musulman et celles des calendriers julien et grégorien*, Tanger, 1887 (to 1500 A.H.).

On the Ottoman reform: Ghazi Ahmed Mukhtar Pasha, *Islāḥ et-teqwīm* (Arabic and Turkish), Cairo, 1307 (1890) [tr. *Réforme du Calendrier par O(sman) N(ouri)*, Leyden, 1903].

General: Ideler, *Handbuch der Chronologie*, Berlin, 1825, 1826, ii. 471–512: 'The Arabs'; Fr. Rühl, *Chronologie*, Berlin, 1897, § 38; al-Bīrūnī's *Chronologie orient. Völker*, ed. (in Arabic) E. Sachau, 1878 [tr. London, 1879].

K. VOLLERS

CALENDAR (Persian).—The ancient Iranian calendar falls into two distinct categories—the Old Persian and the Avesta—which differ from each other in important respects, although the former system, dating, at least, from the period of the Achæmenians (*q.v.*), shows certain tendencies which were later fully developed in the Avesta reckoning of time.

1. The Old Persian calendar was divided into twelve months, but the names of only nine of these are known, and their exact sequence is a matter of doubt. The Old Persian inscription of Darius at Behistūn records the names as follows: Garmapada ('footstep of heat'), Thūravāhara ('mighty spring'), Thāigarci ('garlic-gatherer' [?]), Bāgayādi ('homage to the deities'), Adukani ('digging of the canals'), Āthriyādiya ('worship of the fire'), Anāmaka ('nameless'), and Viyakhna ('ice-free' [?], 'assembly-month' [?]), to which the New Elamitic version (iii. 43) adds Markazanash (Old Persian **Margazana*, 'brood of birds'). It is clear, from a comparison of the Old Persian and Babylonian versions of the Behistūn inscriptions, that Thūravāhara 30 corresponded to Iyyar (April–May) 30, Thāigarci 9 to Sīvan (May–June) 9, Āthriyādiya 26 to Kislev (November–December) 26, Anāmaka 27 to Ṭebeth (December–January) 27, and Viyakhna 14, 22 to Adar (February–March) 14, 22. Several divergent orders of the Old Persian months have been proposed, particularly by Rawlinson, Oppert, Unger, Justi, and Prašek (and King and Thompson), whose sequences are thus tabulated by Ginzel, *Hdbch. d. mathemat. und techn. Chronologie*, i. (Leipzig, 1906) 276:—

Babylonian.	Old Persian				
	Rawlinson.	Oppert.	Unger.	Justi.	Prašek.
Nīsan	Bāgayādi	Garmapada	Thūravāhara	Thūravāhara	.....
Iyyar	Thūravāhara	Thūravāhara	Thāigarci	Thāigarci	Thūravāhara
Sīvan	Thāigarci	Thāigarci	Adukani	Adukani	Thāigarci
Tammūz	Adukani	.....	Margazana	.....	Garmapada
Āb	Garmapada	.....	Garmapada	Garmapada	.....
Elūl	.....	.....	.....	.....	.....
Tishrī	.....	Bāgayādi	Bāgayādi	Bāgayādi	Bāgayādi
Marcheshvan	Margazana	Adukani	.....	.....	Adukani
Kislev	Āthriyādiya	Āthriyādiya	Āthriyādiya	Āthriyādiya	Āthriyādiya
Ṭebeth	Anāmaka	Anāmaka	Anāmaka	Anāmaka	Anāmaka
Shebaṭ	.....	Margazana	.....	Margazana	Margazana
Adar	Viyakhna	Viyakhna	Viyakhna	Viyakhna	Viyakhna

Of all these series, Oppert's seems the most probable to the present writer, who has abandoned the view expressed by him in Geiger-Kuhn's *Grundriss der iran. Philologie*, ii. (Strassburg, 1904) 677.

The date at which the year began is as uncertain as the order of the months. Oppert suggests that it commenced with Bāgayādi (September–October), which is admitted by all to have corresponded with the Babylonian Tishri. This would, of course, correspond with the beginning of the Hebrew civil year (cf. Ex 23^{16} 34^{22}), and might receive a certain degree of support from the name of the month, 'homage to the deities.' It seems far more probable, however, that the year actually began with Garmapada (or, according to Justi, with Thūravāhara), corresponding to Nisan (March–April). This would make the commencement of the old Persian year harmonize with both the Avesta and the Babylonian systems, as well as with the Hebrew sacred year (cf. Ex 12^{18}).

The days of the month were numbered, instead of named, as in the Avesta calendar, except that the last day of the month was termed *jiyamna*, 'diminishing,' 'ending.' There were, apparently, thirty days in each month, as in the Avesta and the early Babylonian calendars. The year contained 365 days, as is shown by the only reference in any classical author to the Iranian calendar: 'Magos trecenti et sexaginta quinque iuvenes sequebantur puniceis amiculis velati, diebus totius anni pares numero: quippe Persis quoque in totidem dies descriptus est annus' (Quintus Curtius, III. iii. 10). Nothing is known of any method of intercalation employed in the Old Persian calendar.

2. The Avesta calendar is much better known than the Old Persian, although the Avesta writings themselves contain no formal list of months. *Āfrīngān* iii. 7–11, it is true, gives the names of five months and five days, and both the *Sīrōzas* give the names of the thirty days of the month; but the most reliable source for the month-list is the Pahlavi literature, which is supplemented to a certain extent by Perso-Arabic writers and a few Byzantine chronologists. Thus *Būndahišn* xxv. 20 (tr. West, *SBE* v. 97) states that 'the auspicious month Fravarṭīn, the month Arṭavahišt, and the month Horvadaṭ are spring; the month Tīr, the month Amerōdaṭ, and the month Šatvaīrō are summer; the month Mitrō, the month Āvān, and the month Ātarō are autumn; the month Dīn, the month Vohūman, and the month Spendarmaṭ are winter.' The days of the month were named as follows: Aūharmazd, Vohūman, Arṭavahišt, Šatvaīrō, Spendarmaṭ, Horvadaṭ, Amerōdaṭ, Dīn pa Ātarō, Ātarō, Āvān, Xūršēṭ, Māh, Tīr, Gōš, Dīn pa Mitrō, Mitrō, Srōš, Rašnū, Fravarṭīn, Vāhrām, Rām, Vāt, Dīn pa Dīn, Dīn, Arṭ, Āštāṭ, Āsmān, Zamyāṭ, Māraspend, and Anīrān (cf. *Būndahišn* xxvii. 24; *Shāyast lā-Shāyast* xxii.–xxiii.; and the *Mādigān-ī Sī-rōz*, tr. Darab Peshotan Sanjana, in Karaka, *History of the Parsis*, London, 1884, i. 134–144). This order, both of months and of days, receives abundant confirmation from the Arabic al-Bīrūnī (*Chronol. of Ancient Nations*, tr. Sachau, London, 1879, p. 52 f.), Mas'ūdī (*Prairies d'or*, ed. Barbier de Meynard and Pavet de Courteille, Paris, 1861–1877, iii. 413 f.), Ulugh Beg (*Epochae celebriores*, ed. Gravius, London, 1650, pp. 23–26, 101 f.), and al-Farghani (*Elementa Astronomica*, ed. Golius, Amsterdam, 1669, p. 4), as well as from the Greek Isaac Argyrus and Theodorus Meliteniotes (Gray, *Byzant. Ztschr.* xi. 470), and from a MS said by Burton (*Λείψανα veteris linguae Persicae*, Lübeck, 1720, p. 6; cf. Lagarde, *Gesam. Abhandl.*, Leipzig, 1866, pp. 229–232) to have been used by him at Lambeth, although all trace of it is now lost.

The problem of the origin of the names of the Avesta months is a difficult one. Kuka (*K. R. Cama Memorial Volume*, Bombay, 1900, pp. 54–73) and Gray (*AJSL* xx. 194–201) have sought explanations from divergent points of view, the former maintaining that the Avesta year originally began with Dīn, which was primarily the first month of spring (falling gradually behind because of the lack of a system of intercalation, until, by the time of the composition of the *Būndahišn*, Fravarṭīn had become the commencement of spring); and the latter holding to the *Būndahišn*, and endeavouring to trace a borrowing from the Babylonian system on the part of the Iranians. While the arguments of Kuka have certain points in their favour, his fundamental assumption is doubtful. The entire evidence at our disposal makes Fravarṭīn (March–April) the first month of the

year, and the parallels with the Babylonian calendar, which Kuka practically overlooks, are too striking to be ignored. For a full elaboration of the position here taken, reference may be made to the study of Gray noted above, in which the name of the month Fravarṭīn is interpreted as referring to the ghosts of the righteous dead; Arṭavahišt as the re-vivification of the earth after its death in winter (cf. *Dīnkart* VII. xxx. 14, VIII. xxxvii. 14, IX. xxx. 14); Horvadaṭ as the vernal rains preparing for the coming harvest; Tīr as the month of the rising of the dog-star; Amerōdaṭ as the vegetation of harvest time; Šatvaīrō as the month either of new ploughing, or, more probably, of building; Mitrō as the sun month (cf. Shamash as the guardian of Tishri, the seventh Babylonian month); Āvān as the rains of autumn; Ātarō as the fire which protects against the cold winter; Dīn possibly in defiance of Ahrimaa, who created winter; Vohūman as the first-born of Dīn=Ormazd; and Spendarmaṭ as a fertility-deity of early spring. (For the naive etymologies of a Parsī *rivāyat*, see Unvala, in *Spiegel Memorial Volume*, p. 202 f.)

3. In each Avesta month, followed by the Armenian system, there were thirty days, each named as noted above, and preserving, for the first seven days, the regular order of Ormazd and the Amshaspands, which was violated in the series of month-names, perhaps for the reasons just noted. The fact that the first, eighth, fifteenth, and twenty-third days of each month are named in honour of Ormazd has led some to suppose that the Avesta recognizes a sort of week. Of this there is no evidence whatever. It has been shown, however, by Nadershah (*Cama Memorial Volume*, pp. 246–249) that this order of names of the days rests upon *Yasna* xvi. 3–6, and that it comprises four groups, containing respectively the Amshaspands, the seven planets, moral objects, and religious objects, each headed by the supreme god Ormazd, the entire group primarily representing the twenty-seven lunar mansions (cf. Ginzel, *op. cit.* pp. 70–77). To the end of the year, which thus comprised 360 days, were added five Gāthā-days, each sacred to one of the five great divisions of the Gāthās: Ahunavaiti, Uštavaiti, Spenta Mainyu, Vohu Xšathra, and Vahištōišti (cf. al-Bīrūnī, *op. cit.* pp. 53–54, 383; Ginzel, *op. cit.* p. 287). To allow for the quarter-day thus lost each year, a month was intercalated every 120 years.

4. The Avesta year was primarily divided into a summer (*ham*) of seven months and a winter (*zayan*, *zyam*) of five (gloss to *Vendīdād* i. 3; *Būndahišn* xxv. 7). Spring and autumn seem not to be recognized in the Avesta. In later times, however, the year was divided into spring (*vahār*), summer (*hāmīn*), autumn (*pātīz*), and winter (*zamistān*), each of three months (*Būndahišn*, xxv. 20). The Avesta itself, on the other hand, has a division of the year into six unequal parts, called *gāhanbārs*, which, though later interpreted as celebrating the six periods of creation (*Būndahišn*, xxv. 1), were douhtless originally popular festivals.

The *gāhanbārs* were as follows: *maiδyōizaremaya*, 'mid-spring' (corresponding theoretically to May 1–5), *maiδyōišema*, 'mid-summer' (June 31–July 4), *paitišhahya*, 'grain-bringing' (Sept. 12–16), *ayāθrima*, 'home-coming' (Oct. 12–16), *maiδyāirya*, 'mid-year' (Dec. 31–Jan. 4), and *hamaspaθmaēdaya*, of uncertain meaning (Mar. 15–20); slightly varying days are given by others, depending on the day taken as the first of the year—March 8 or 15 (as by Bartholomae, *Altiran. Wörterb.*, Strassburg, 1904, coll. 1118 f., 838, 160, 1117, 1776, and Ginzel, *op. cit.* p. 285). The *gāhanbārs* accordingly fell at varying intervals, so that *maiδyōizaremaya-maiδyōišema* = 45 days, *maiδyōišema-paitišhahya* = 60 days, *paitišhahya-ayāθrima* = 75 days, *ayāθrima-maiδyāirya* = 30 days, *maiδyāirya-hamaspaθmaēdaya* = 80 days, and *hamaspaθmaēdaya-maiδyōizaremaya* = 75 days. Perhaps the best explanation of the *gāhanbārs* is that of Cama (*Actes du vi. Congr. Internat. des Orientalistes*, iii. 583–592), who combines the twofold division of the year into a winter of five months and a summer of seven, and four seasons of three months each. The first, second, and fifth *gāhanbārs*, according to Cama, fell in mid-seasons, *i.e.* in the middle of the spring of three months, the summer of seven months, and the winter of five months; while the third, fourth, and sixth *gāhanbārs* fell at the ends of seasons, *i.e.* at the end of the spring of three months, the summer of seven months, and the winter of three months. It may also be noted in passing that attempts have been made, as by Nadershah (*op. cit.* pp. 267–270), to establish a double year, one (*sareδ*) commencing with the vernal equinox and the other (*yār*) with the autumnal equinox. This, however, is extremely doubtful.

5. The day was divided into five parts, called *gāhs*. These were *hāvani*, 'time of preparation of the haoma' (dawn to noon), *rapiθwina* (noon to 3 p.m.), *uzayeirina*, 'afternoon' (3 p.m. to twilight), *aiwisrūθrima aibigaya*, of uncertain meaning (twilight to midnight), and *ušahina*, 'dawn' (midnight to dawn). In winter, however, *rapiθwina* was omitted, and *hāvani* was extended from dawn to the middle of the afternoon. The night, in like manner, was divided into four parts, which were also included in the *gāhs*. These were (*Frāhang-ī-ōīm*, ed. Reichelt, Vienna, 1900, p. 36; Jamaspji and Haug, *An Old Zand-Pahlavi Glossary*, Stuttgart, 1867, pp. 42, 76–77) *hū frāšmōdāiti*, 'sunset' (sunset to darkness), *erezaurvaēsa*, 'turning of darkness' (darkness to midnight), *ušām sūrām*, 'holy dawn' (midnight to grey dawn), and *raocanhām fragati*, 'coming forth of light' (grey dawn to sunrise).

6. The Avesta year, as here outlined, is the ideal one. In the course of time the dates gradually fell behind, both in the normal method of reckoning, and as a result of the neglect of intercalation in consequence of the troublous times which followed the downfall of the Sasanians on the death of Yazdagird (A.D. 651). In the very earliest period, according to al-Bīrūnī (*op. cit.* 13), the Persian year contained but 360 days, one month being intercalated every six years, and two months every 120 years.

According to Persian tradition, moreover, the entire system of intercalation dates from the period of Zoroaster (*ib.* p. 55; *Cama Memorial Volume*, p. 235 f.). Seventy years before the death of Yazdagird, two months were again intercalated, despite the five epagomenal days of each year, one as the necessary proceeding, and the second 'with regard to the future, that no other intercalation might be needed for a long period' (*ib.* p. 38; cf. pp. 12, 54). The position of the intercalated month varied. Shah Khulji, quoted by Hyde (*Historia religionis veterum Persarum*, Oxford, 1700, p. 203 ff.), states that the first month intercalated was put after Fravarṭīn, the second after Arṭavahišt, and so on, until after the lapse of 1440 years the intercalated month should normally come again after Fravarṭīn. By the time of Shah Khulji, Ulugh Beg (*Epochæ cel.* p. 23), Kutb-ad-dīn (*ap.* Hyde, p. 205), and al-Bīrūnī (*op. cit.* 53), the five epagomenal days, and, by implication, the intercalated month, came after Āvān. No attempt was made to correct the confusion of the Persian year until the reign of the Seljūk sultan Jalāl-ad-dīn Malik Shāh (A.D. 1073–1092), who re-established the old system firmly, taking as the first of Fravarṭīn, the New Year, March 15, 1079, and placing the epagomenal days in their original position at the end of Fravarṭīn. This reformed era, known as the 'era of Jalāl-ad-dīn,' still remains in force among the Zoroastrians. There is, however, a sectarian division among the Parsis of India (although not among the Zoroastrians of

Persia), since, after the Persians lost their independence, they failed, for some reason, to make the proper intercalation, whereas those Zoroastrians who sought refuge in India had, according to tradition, made this intercalation while still in Khorasan. The Shahinshai sect, which claims that intercalation is allowable, is, therefore, one month ahead of the Kadmis, who regard intercalation as merely political in origin, not religious. This difference is of importance as affecting the religious festivals, each sect denying the validity of the feasts of the other. The divergency was formerly the cause of bitter dissensions, which are now, happily, appeased (see Karaka, *Hist. of the Parsis*, i. 105–117).

7. The reduction of dates of the 'era of Jalāl-ad-dīn' to those of the Christian era is somewhat involved, and varies by a day, unless the precise name of the day of the original calendar be given. If tables (noted in the Bibliography) be not at hand, the following method may be used (see Ginzel, *op. cit.* p. 302 ff.). Multiply the *expired* year of the 'era of Jalāl-ad-dīn' (not the one of which the date is given) by 365·242535. Add to the product the sum of days of the *unexpired* year plus 393812 (the sum of days from 1st Jan. A.D. 1 to 15th March A.D. 1079, the beginning of the 'era of Jalāl-ad-dīn'). Divide the sum by 1461 (the days in a four-year cycle, A.D.). Multiply the quotient by four, and add the remainder, reduced from days to years, months, and days of the Christian era. The result will be the corresponding date A.D. Conversely, to reduce dates A.D. to the 'era of Jalāl-ad-dīn' (usually termed A.Y., *i.e.* Anno Yazdagirdis), divide the *expired* year A.D. by four, and multiply the quotient by 1461. Add to the product the number of days in the *unexpired* year A.D., and subtract from this sum 393812. Divide the remainder by 365·242535, the quotient being the years A.Y. Reduce the remainder to months and days A.Y., and the result will be the corresponding date A.Y. which is desired.

8. Mention may be made in passing of two documents giving exact equivalents for dates A.Y. and A.D. The first of these is an anonymous Byzantine author (ed. Scaliger, *Canones isagogicae*, Paris, 1658, p. 314 f.; Petau, *de Doctrina Temporum*, Paris, 1703, ii. 213; Gray, *Byzant. Ztschr.* xi. 471 f., and *Avesta, Pahlavi, and Ancient Persian Studies in Honour of . . . Sānjana*, Bombay, 1904, p. 174 f.), who states that in A.D. 1443 (= A.Y. 812) Tīr 17 corresponded to March 11, Mitrō 20 to June 12, Dīn 24 to Sept. 14, and Fravarṭīn 18 to Dec. 12. The other text is an Oriental chronicle-table for A.D. 1687 (*Ephemerides Persarum per totum annum*, ed. Beck, Augsburg, 1695), which shows that in that year Fravarṭīn 1 of the Old Avesta calendar = Mitrō 22 of the 'era of Jalāl-ad-dīn' = Sept. 28, etc., thus indicating that between A.D. 1443 and 1687 the calendar had fallen behind two months.

9. The influence of the Iranian calendar was far-reaching. Not only were the Cappadocian month-names borrowed *in toto* from the Avesta-Pahlavi system (Benfey and Stern, *Ueber die Monatsnamen einiger alten Völker*, Berlin, 1836, pp. 76–120; Lagarde, *op. cit.* pp. 258–264), but many of the names of the months in the Armenian (given by Dulaurier, *Recherches sur la chronologie arménienne*, Paris, 1859, pp. 10–14), Chorasmian, and Sogdian (al-Bīrūni, *op. cit.* pp. 56 f., 82 f.; cf. *SBAW*, 1907, p. 465) menologies were taken from the Zoroastrian calendar, while sporadic borrowings may be traced in the month-names of Albania (given by Dulaurier, p. 167, Azaria of Julfa [early 17th cent.], *op. cit.* p. 115 ff.), Seistan (al-Bīrūni, p. 52 f.), Bukhārik (Bokhara [?]; al-Bīrūni, p. 82 f.), and Qubā (a large city of Farghana, near Shash; *ib.* p. 82 f.). Those month-names of these various calendars which seem to show Zoroastrian influence (the Old Persian system here plays no part, unless Marquart, *Philologus*, lv. 235, be right in explaining the Armenian name of the eleventh month, Margaç, as a loan-word from the Old Persian *Margazana*), are as follows, summarized from Gray, 'On Certain Persian and Armenian Month-Names as influenced by the Avesta Calendar,' in *JAOS* xxviii. [1907] 331–344:

1. Fravarṭīn = Chorasmian Nāusārji (this, like the four following names, representing the Avesta **nava-sareδa*, 'new year'), Sogdian-Bukhārik Nūsard, Armenian Navasard, Albanian Navasardus, while the Seistanian Kavāδ may represent the Avesta hero Kavāta, the legendary founder of the Kayanian dynasty, whose home was in Seistan (*Yasht* xix. 65 ff.; cf. Geiger, *Ostiranische Kultur*, p. 411; Azaria of Julfa's Sams is borrowed from the Arabic *šams*, 'sun'). 2. Arṭavahišt = Chorasmian Ardūst (the Sogdian Fadi Nūsard may be for Avesta **paitinavasareδa*, 'after the new year'). 3. Horvadaṭ = Chorasmian Harudāδ (the Sogdian Nīsan and Azaria of Julfa's Sbat' are loan-names from the Hebrew calendar). 4. Tīr = Chorasmian Jīrī, Seistanian Tīrkyānūa (uncertain vocalization), Armenian Trē (if the Albanian Yilē be connected with Albanian *ül*, *il*, 'star' [cf. Meyer, *Etymologisches Wörterbuch der albanesischen Sprache*, Strassburg, 1891, p. 460], it may possibly be a reminiscence of the Zoroastrian name of this month). 5. Amerōdaṭ = Chorasmian Hamdād (Azaria of Julfa's Gamar is the Arabic *qamar*, 'moon'). 6. Šatvairō = Chorasmian Axšarirvarī (the vocalization, except for the *matres lectionis*, uncertain, as in many of these names). 7. Mitrō = Quhān Mihr, Armenian Mihekan (Azaria of Julfa, probably through retrogression of the calendar, has Tīr = Tīr), Chorasmian Fīy (Turfān Bay(a)kānj) = Baya, 'god,' *i.e.* Mithra. 8. Āvān = Sogdian Abānj. 9. Aṭarō = Chorasmian Arū (read, with some of the variants, Adū), Armenian Ahekan (Lagarde, p. 9; Hübschmann, *Armenische Grammatik*, Leipzig, 1897, i. 95; Azaria of Julfa has Hamir = Arabic *amir*, while the Sogdian Fūy (Turfān Būyīj) represents a dialectic development of the Avesta *baya*, 'god'). 10. Dīn (Avesta *daθušō* '[month] of the Creator') = Chorasmian Rīmažd (the Sogdian Masāfūy, 'great god,' is clearly a reminiscence of the Avesta name of the month, while Azaria of Julfa's Aram is the eponymous hero of Armenia, and the Bukhārik Sīvan the Hebrew Sīvan, calendrical retrogression again playing a part). 11. Vohūman = Chorasmian Ašman (cf. al-Bīrūni, p. 384; the Seistanian Karsn—uncertain vocalization—may represent the Karsna of *Yasht* xiii. 106, 108, who may, perhaps, be the eponymous hero of the Qāren dynasty which played an important part in the Arsacid and Sasanian periods [Darmesteter, *Le Zend-Avesta*, ii. 536, note 212]). 12. Spendarmaṭ = Chorasmian Asbandārmajī (the Armenian Hrotiç is a loan-name from the Pahlavi **fravarṭakān*, 'the [five epagomenal days] dedicated to the Fravashis,' Hübschmann, p. 184 f.; Lagarde, p. 163).

The correspondences in the names of the days between the Zoroastrian and the Chorasmian and Sogdian calendars are as follows: 1. Aŭharmazd = Chorasmian Rīmažd, Sogdian Xarmažd. 3. Arṭavahišt = Chorasmian Ardūšt, Sogdian Ardāxūšt. 4. Šatvairō = Chorasmian Axšarivarī, Sogdian Xastšūr. 5. Spendarmaṭ = Chorasmian Asbandārmajī, Sogdian Sbandārmaš. 6. Horvadaṭ = Chorasmian Harūdāδ, Sogdian Radad (?). 7. Amerōdaṭ = Chorasmian Hamdāδ, Sogdian Mardad. 8, 15, 23. Dīn = Chorasmian Daδū, Sogdian Dast. 9. Aṭarō = Chorasmian Arū (read Adū), Sogdian Atas. 11. Xūršeṭ = Chorasmian Axīr, Sogdian Xvīr. 12. Māh = Chorasmian Māh, Sogdian Māx. 13. Tīr = Chorasmian Jīzī, Sogdian Tīš. 14. Gōš = Chorasmian Fūšt, Sogdian Fuš. 17. Srōš = Chorasmian Asrūf (read Asrūš(?)), Sogdian Sruš. 18. Rašnū = Chorasmian Rašn, Sogdian Raan. 19. Fravarṭīn = Sogdian Frūδ. 21. Rām = Chorasmian Rām, Sogdian Rāmn. 22. Vāṭ = Chorasmian and Sogdian Vāδ. 24. Dīn = Chorasmian Dīnī, Sogdian Dīn. 25. Arṭ = Chorasmian Arjūxī (cf. Nöldeke, *SWAW* cxvi. 418, note 4), Sogdian Arδx. 26. Aštāṭ = Chorasmian Aštāδ, Sogdian Astāδ. 27. Asmān = Chorasmian Asmān, Sogdian Samn. 28. Zamyāṭ = Sogdian Rāmjīd (read Zāmjīd). 29. Māraspānd = Chorasmian Marasband.

The Sogdians likewise gave special names to each of the five epagomenal days (al-Bīrūni, p. 57), and the Chorasmians had names for the six *gāhanbārs* (*ib.* p. 225, cf. p. 425 f.), while the Armenians, it has been suggested (Dulaurier, p. 13), also did so originally; but the exact meanings of the appellations, even when compared with their corresponding terms in the Zoroastrian calendar, are uncertain. According to al-Bīrūni, moreover, both these nations, like the Armenians and Albanians (Dulaurier, pp. 115 ff., 167), placed the epagomenal days at the end of the year, as in the early Avesta calendar, instead of violating this custom, as in the middle period of the Avesta system. The Chorasmians had, in addition, a series of eras, first from the commencement of their colonization of the country, 980 years before Alexander the Great; then from the coming of Siyavush ben Kai Kaus to Chorasmia, ninety-two years later; and, finally, according to the reigns of sovereigns.

The Avestan custom of naming the days of the month also existed among the Armenians (Alishan, *Ancient Faith of the Armenians* [in Armenian], Venice, 1895, p. 143 f.). Although the majority of these names are Christian or geographical, Zoroastrian influence is evident in at least five: Mihr, the eighth day (corresponding to the seventh month and the sixteenth day of each month in the Zoroastrian calendar); Aramazd, the fifteenth day (corresponding to the first day of each month in the Zoroastrian calendar); Anahit, the nineteenth day (corresponding to the Iranian goddess Anāhita); Npat, the twenty-sixth day (corresponding to the Indo-Iranian water-deity Apām Napāt, but confused with the Armenian mountain called Npat); and Vahagn, the twenty-seventh day (corresponding to the twentieth day of each month in the Zoroastrian calendar) [cf. above, vol. i. p. 802]. Six of the Iranian names here considered were even borrowed, through their Sogdian forms, as planet names in Chinese (*SBAW*, 1907, p. 459), these being, in Can-

tonese pronunciation: Mit (Sogdian Mīr, 'Mithra'), Mok (Sogdian Māx, 'Māh'), Wən-hon (Sogdian Wunxān, 'Bahrām'), Tit (Sogdian Tīr, 'Tir'), Wun-mut-əï (Sogdian Wurmažd, 'Ormazd'), and Na-k'it (Sogdian Nāhī, 'Anāhita').

It should also be noted that an attempt was made by Yazdagird III. to give both the months and days of the Zoroastrian year entirely different names, but his innovations soon met the oblivion they richly merited (Hyde, *Historia religionis veterum Persarum*, pp. 195–200).

10. In conclusion, the comparative table given below[1] may serve to elucidate the mutual correspondences of the ideal Babylonian, Old Persian, Avesta, and Julian months.

LITERATURE.—The principal literature on the Iranian calendar, together with the chief references to the original texts, is given by Gray, 'Der iranische Kalender,' in Geiger-Kuhn, *Grundriss der iran. Philologie*, ii. 675–678, Strassburg, 1904. Older works of importance, there overlooked, and later treatises are Ulugh Beg, *Epochae celebriores*, ed. Graviue, London, 1650, *Ephemerides Persarum per totum annum*, ed. Beck, Augsburg, 1695; Usener, *Ad historiam astronomiae symbola*, Bonn, 1867 (valuable for Byzantine texts on the Persian calendar); Gray, 'Zu den byzant. Angaben über den altiran. Kalender,' in *Byzant. Ztschr.* xi. 468–472, 'Medieval Greek References to the Avestan Calendar,' in *Avesta, Pahlavi, and Ancient Persian Studies in Honour of . . . Sānjana*, Bombay, 1904, pp. 167–175, 'The Origin of the Names of the Avesta Months,' in *AJSL* xx. 194–201, 'On Certain Persian and Armenian Month-Names as influenced by the Avesta Calendar,' in *JAOS* xxviii. 331–344; six studies in the *K. R. Cama Memorial Volume*, Bombay, 1900: Bharucha, 'Pâzend and English Versions of a Chapter of the Pahlavi Dinkard, relating to the Solar and Luni-Solar Years in the Zoroastrian Religion,' pp. 12–28; Kuka, 'An Enquiry into the order of the Parsi Months and the Basis of their Nomenclature,' pp. 54–73; Karkaria, 'The Parsi and the French Revolutionary Calendars,' pp. 146–153; Unwala, 'Two Persian Passages about the Kabiseh (Intercalation),' pp. 235–238; Desai, 'The Persian Year,' p. 241 ff.; and Nadershah, 'The Zoroastrian Months and Years with their Divisions in the Avestaic Age,' pp. 244–273; two studies in the *Spiegel Memorial Volume*, Bombay, 1908, by Unvala, 'A Few Parsee Festivals (Jashans) according to an Old Parsee Manuscript,' p. 201 ff., and K. R. Cama, 'The Zoroastrian Calendar,' p. 230 ff.; Marquart, *Philologus*, lv. 234 ff., and Supplementband, x. [1907] 198–215; F. W. K. Müller, 'Die "persischen" Kalenderausdrücke im chinesischen Tripiṭaka,' *SBAW*, 1907, pp. 458–465; Inostrancev, *Sasanidskie Etyudy*, St. Petersburg, 1909, pp. 82–109; Ginzel, *Handbuch der mathematischen und technischen Chronologie*, Leipzig, 1906, i. 275–309. Comparative chronological tables of the Persian and Christian eras are given in the edition of Ulugh Beg noted above, and in Schram, *DWAW*, mathematische Klasse, xlv. 328–331, Vienna, 1882, and *Kalendariographische und chronologische Tafeln*, Leipzig, 1908, pp. xxi–xxiii, 159, 173–181.

LOUIS H. GRAY.

CALENDAR (Polynesian).—The calendrical development of the islands of the Pacific was considerably higher than that of Africa, with which, however, it offers more than one analogue. In the western portion much influence has been exercised by higher civilizations. This is especially clear in Java, where the Muhammadan lunar year of 354 days is reckoned according to the Indian *śaka* era (beginning with A.D. 78); the month, with Muhammadan names, is divided, in Indian fashion, into a 'light' and a 'dark' half; seven days of the week bear two sets of names, one being Muhammadan and the other Indian; and one of the two systems of intercalation is Arabic, while the other is Turkish (for details, see Ginzel, *Handbuch der mathematischen und technischen Chronologie*, Leipzig, 1906, i. 414–418).

A cycle of 210 days is formed by 30 seven-day weeks, each of which is ruled by an ancient Javanese deity and has its own name: *Sinto*, *Landēp*, *Wukir*, *Kurantil*, *Tolu*, *Grūmbreg*, *Warigo*, *Wariga-gung*, *Julung-wangi*, *Sungsang*, *Galungan*, *Kuningan*, *Lankir*, *Mondhosio*, *Julung-pujat*, *Pahang*, *Kuruwelut*, *Marakeh*, *Tanbir*, *Madhan-kungan*, *Maktal*, *Wuye*, *Manahil*, *Prang-bakat*, *Bolo*, *Wugu*, *Wayang*, *Kulawu*, *Dhukut*, and *Watu-gunung*; and this cycle (*wuku*) is divided, for purposes of divination, into periods of 10, 9, 8, 6, 4, 3, 2, and 1 days. Side by side with the *wuku* is the *pasar*, or market-week, of 5 days—*Pahing* (or *Pa*), *Pon*, *Wagē*, *Kaliwon*, and *Legi* (or *Manis*)—which finds a parallel in the Yoruba week (see above, p. 64[a]), and which is also observed by the non-Muhammadan Lampong of Sumatra. The days of the *pasar* are combined with the seven-day week of the *wuku* (*Buddha-Kaliwon*, *Respati-Manis*, . . . *Buddha-Pahing*, *Respati-Pon*, etc.), so that, after the thirty-fifth combination, the initial point (*Buddha-Kaliwon*, etc.) is again reached. Six of these periods coincide with a *wuku*, and twelve give the *wuku* year of 420 days, an astrological year.

Besides this lunar year, the Javanese have the solar year, which is divided into 12 *mangsas* (Skr. *māṃsa*, 'time' [a meaning found only in the native lexicographers, not in Skr. literature]), which vary in length: *Kasa* (41 days), *Karo* (23 days), *Katiga* (24 days), *Kapat* (25 days), *Kalima* (27 days), *Kanem* (43 days), *Kapitu* (43 days), *Kawolu* (26 days), *Kasanga* (25 days), *Kasadasa* (24 days), *Desta* (23 days), *Sada* (41 days), this year of 365 days being that determined, after much previous irregularity in reckoning, by Sultan Paku Buwana VII. and beginning 22 June 1855. Every 4 years *Kawolu* is given an extra day for intercalation; and it is this solar year which is the one indigenous to Java. The native Javanese day has only general divisions into early dawn, dawn, sunrise, forenoon, etc., but the five Muhammadan hours of prayer and the Indian astrological divisions are also kept.

The lunar year is observed by the inhabitants of the Tennger range in S.E. Java. This has 12 months (alternately 29 and 30 days in length), or 354 days, but in each last year of its five-year cycle a month of 30 days is intercalated. This *windu*, or cycle, accordingly has 1800 days, thus corresponding almost precisely to the Indian *yuga*, which consists of 5 years or 1830 days. In other respects the usual Javanese system is closely followed; and the same statement holds good of the neighbouring island of Bali, except that here intercalation is more irregularly performed, normally taking place at the expiration of 64 months, of which 30 have 29 days, while 34 have 30, this total of 1890 days corresponding to 9 Javanese *wukus* of 210 days each, and also to 5 Indian years of 378 days each (on this Indian year, cf. Ginzel, *op. cit.* p. 322). It is especially noteworthy that both in the Balinese and in the Javanese *mangsas* the first ten names, already listed, are based on the Javanese ordinals, while the last two (*Desta* or *Yesta*, and *Sada*, *Sodha*, or *Aśada*) are borrowed from the Skr. month-names *Jyeṣṭha* and *Āṣāḍha* (approximately May–June and June–July).

[1] BABYLONIAN.	OLD PERSIAN.	AVESTA.	JULIAN.
Nīsan	Garmapada	Fravarṭīn	March–April
Īyyar	Thūravāhara	Arṭavahišt	April–May
Sivan	Thāigarci	Horvadaṭ	May–June
Ṭammūz	.....	Tīr	June–July
Āb	.....	Amerōdaṭ	July–August
Elūl	.....	Šatvaīrō	August–September
Tishrī	Bāgayādi	Mitrō	September–October
Marcheshvan	Ādukani	Āvān	October–November
Kislev	Āthriyādiya	Āṭarō	November–December
Ṭebeth	Anāmaka	Dīn	December–January
Shebaṭ	Margazana	Vohūman	January–February
Adar	Viyakhna	Spendarmaṭ	February–March

This may imply that the Bali-Javanese year originally had only 10 months (cf. Ginzel, *op. cit.* p. 425)—a curious phenomenon which is recorded for the Gilbert Islands by Hale (*U.S. Exploring Expedition, Ethnography and Philology*, Philadelphia, 1846, p. 105 f.), and is seen also among the Maori and possibly in the Caroline Islands, although, as Gerland (*Anthrop. der Naturvölker*, Leipzig, 1860–77, vi. 72 f.) well urges, all these cases of alleged ten-month years may be based on error. At the same time, one involuntarily thinks of the Roman tradition that previous to Numa, who added Jan. and Feb., the year consisted of only ten months (cf. Plutarch, *Vita Numæ*, xviii. f., and see below, p. 134[a]).

With diminishing influence from Hinduism and Muhammadanism goes a decrease in the calendrical skill of the Malayo-Polynesian and allied peoples. This comes out clearly in the case of the Sumatran Lampong and Achinese (the latter having an elaborate system of synchronizing the lunar year with the season by *kenongs* evidently borrowed from the Indian *nakṣatra* year [see Ginzel, *Hdb. d. math. u. tech. Chron.* pp. 428–430]), as contrasted with the pagan Battak, even though the latter show, in their names of the days of the month, reminiscences of the Indian names of the seven-day week (cf. the list given by Ginzel, *op. cit.* p. 427). Yet these Battak, though they reckon their months from new moon to new moon, have no real era, but compute extra-annually by *remis* of from 9 to 12 years, while they do not even have a fixed period for the beginning of each year. The Battak year is essentially a terrestrial one, as contrasted with the lunar, solar, or luni-solar year, being determined by terrestrial phenomena such as the monsoons, the growth of vegetation, etc., though observations are also made of the Pleiades, Orion, Scorpio, and Venus. None of the Sumatran peoples are acquainted with the hour; the day receives, as already noted for Java, only general subdivisions for early afternoon, late afternoon, sunset, midnight, etc.

In Melanesia the system of reckoning time is most primitive. The standard of measure is, of course, the moon, but there is no indigenous concept of the year; *tau* or *niulu*, commonly used for 'year,' properly connoting only 'season' (as the '*tau* of the yam,' the banana having no *tau*, since it is in fruit throughout the year).

'It is impossible to fit the native succession of moons into a solar year; months have their names from what is done and what happens when the moon appears and while it lasts; the same moon has different names' (Codrington, *Melanesians*, Oxford, 1891, p. 349). For example, the moons of the year on Mota, of the Banks Islands group, may be given as follows: *Magoto qaro* ('fresh grass,' corresponding to April), *Magoto rango* ('withered grass'), *Nago rara* ('face of winter,' the *rara*, or erythrina, flowering in the cold season), *Tur rara* ('fullness of winter'), *Kere rara* ('end of winter'), *Un rig* or *Un gogona* ('little or bitter palolo,' a few of these annelids appearing at this full moon), *Un lava* ('great palolo,' the annelid appearing on the reef in immense numbers on one night at full moon, this serving in part as the beginning of a new year, especially as the yam is harvested during this moon), *Un werei* ('rump of the palolo'), *Vule wotgoro* ('moon of shooting up' [of the reeds into flower]), *Vusiaru* (when the wind beats the casuarina trees on the cliffs), *Tetemavuru* (when the hard winds detach fragments from the seeded reeds), and *Lamasag noronoro* ('rattling of dry reeds').

In the Caroline Islands a phenomenon is found, which is, in a sense, characteristic of the Pacific calendar, and which outside this region occurs only in the Armenian and Persian systems (see above, pp. 70, 128)—the naming of the days of each month or moon. In Ponape, for example, the names of the 27 days of the moon are as follows (Christian, *Caroline Islands*, London, 1899, p. 387 f.): *Ir, Leleti, Chanok, Chanok-en-komóni, Chanok-en-komána, Epenok-omur, Epenok-omoa, Chau-pot-mur, Chau-pot-moa, Arichau, Chutak-ran, Eü, Aralok, At, Arre, Echil, Apang, Alim, Aon, Eich, Aual, Malatuatu, Takai-en-pai, Aro-puki, Olo-pua, Olomal*, and *Mat* (similar lists for Lamotrek, the Mortlock Islands, Yap, and Uleai are given by Christian, *op. cit.* pp. 392–395). In Ponape, moreover, as elsewhere in the Carolines, the month is divided into 3 parts: *Rot* ('darkness,' 13 days), *Mach* ('new moon,' 9 days), and *Pul* ('waning moon,' 5 days). The number of months in the Caroline year is 12 (in Lamotrek, for example, *Sarabol, Aramaus, Tumur, Mai-rik, Mai-lap, Seuta, Lahk, Kū, Ul, Alliel, Mán*, and *Ich*); and Freycinet's record of only 10 (*Voyage autour du monde*, Paris, 1827–29, ii. 105)—*Tungur, Mol, Mahclap, Sota, La, Kuhu, Halimatu, Margar, Hiolikol*, and *Mal*—was probably based, as he himself suspected, on erroneous information, especially as each *maram* ('moon,' 'month') possessed but 30 days. In the Ladrones the same explorer (*op. cit.* p. 380) found 13 lunar months (*pulan*) in the year (*sakkan*): *Tumeguini, Maino, Umotaraf, Lumuhu, Magmamao, Mananaf, Semo, Tenhos, Lumamlam, Fagualu, Sumongsugn, Umadjanggan*, and *Umagahaf*; and in the same group Chamisso ('Bemerkungen auf einer Entdeckungsreise,' *Gesammelte Werke*, Cotta ed. iv. 285) found time reckoned by days and moons, but in the Carolines by nights and moons.

Throughout Polynesia time was reckoned by the moon, from 28 to 30 nights forming the month, of which there were, as occasion required, 12 or 13 in the year. This year (or, rather, annual season, for the concept 'year' was scarcely known in its strict sense in Polynesia) began at various periods corresponding to our May, June, March, late December, etc., while the names of the months varied from island to island, and even within the same island (cf. Ellis, *Polynesian Researches*[2], London, 1832–36, i. 86–89; for further details, with abundant references to older literature, see Gerland, *op. cit.* p. 71 ff.).

In Tahiti, where the year (*tàoo*) began about March, the months (*marama, malama*) bore, according to Forster (*Observations made during a Voyage round the World*, London, 1778, p. 504 f.), the following names (cf. the slightly divergent list in Hale, *op. cit.* p. 169 f., where lists for Samoa and Hawaii are also recorded): *O-porore-o-moòa, O-porore-o-moòree, Moorehà, Oohee-eìya, Hooree-àma, Tàowa, Hooree-erre-èrre, O-te-àree, O-te-taì, Warehoo, Wœahou, Pipìrree*, and *A-oo-noonoo*. Each month had 29 days, all with individual names, special names also being borne by each of the six divisions of the day and the six of the night. In Lakemba, in the Fiji group, the 11 months recorded by Hale (*op. cit.* p. 68)—*Sesē-ni-ngasáu-lailai* ('little reed-flower,' corresponding to Feb.), *Sesē-ni-ngasáu-levu* ('great reed-flower'), *Vulai-mbotambota* ('moon of scattering' [the fallen leaves]), *Vulai-kelikeli* ('moon of digging'), *Kawakatangāre, Kawawakā-lailai, Kawawakā-levu* (these three referring to the growth of the yam), *Mbalolo-lailai* ('little palolo' [for the allusion, cf. preceding col.]), *Mbalolo-levu* ('great palolo'), *Nunga-lailai* ('little nunga' [a sort of fish]), and *Nunga-levu* ('great nunga')—recall by their grouping the seasonal nomenclature of the oldest Indian months—*Śukra* ('bright'), *Śuci* ('burning'); *Nabhas* ('cloud'), *Nabhasya* ('cloudy'); *Tapas* ('warmth'), *Tapasya* ('warm'); etc. (Ginzel, *op. cit.* p. 316). In Rotuma Island, belonging to Fiji, we find a 'monsoon year' of 6 moons, the months being repeated semi-annually on account of the regular blowing of westerly and easterly winds: *Oipapa* (March, September), *Taftáfi, Hāua, Kasépi, Fōson-hāu*, and *Aθapuána* (Hale, *op. cit.* p. 169).

With this may perhaps be compared the Nicobarese custom of reckoning by the south-west monsoon (*sho-hong*, May–Oct.) and the north-east monsoon (*fūl*, Nov.–April), two *shom-en-yuh*, or monsoon half years, making approximately a solar year. At the same time, the *kāhēs* (new moons) are named consecutively throughout the year, not re-

peated semi-annually as in Rotuma (see, further, Ginzel, *op. cit.* p. 431 f.). In the Society Islands the year (*matahiti*) was similarly divided into half-years according to the position of the Pleiades: *Matarii i nia* ('Pleiades above' [the horizon]), and *Matarii i raro* ('Pleiades below' [the horizon]). Here again the nights of each lunar month, which were, as necessity required, 12 or 13 in number, and had 30 days each, were named individually, while various seasons (as *Tetau*, 'autumn'; *Te-tau-mitirati*, 'time of high sea'; and *Te-tau-poai*, 'season of drought and scarcity') were also recognized. Ellis (*loc. cit.*) further states that, while the Society Islanders were unacquainted with hours or weeks, they 'marked the progress of the day with sufficient accuracy, by noticing the position of the sun in the firmament, the appearance of the atmosphere, and the ebbing and flowing of the tide.' In like fashion the Hawaiians began their year when the Pleiades rise at sunset. During five months, beginning with *Kaelo* (Jan.), war might be waged, but peace was enjoined during the remainder of the year. Similarly in Tahiti, according to Wilkes (*Narrative of U.S. Exploring Expedition*, Philadelphia, 1850, iv. 42 f.), the first three months were for war; during the fourth the *opelu* was tabu, and in the fifth it was caught; the two moons following were for taxing; the eighth was devoted to prayers, games, and merriment; the ninth contained the annual feast for the payment of taxes; in the tenth the idols were carried about, and taxes were demanded; the eleventh was for the offerings to the dead and the catching of the *boneta*; and the twelfth for the fishing of the same fish. Elsewhere each month had analogous divisions. Thus, in Hawaii,

'during each month there were four tabu periods of two nights and one day each, dedicated severally to each of the four great gods. All their religious rites, as well as their fishing, planting, etc., were regulated by the moon' (Alexander, *Brief Hist. of the Hawaiian People*, New York, 1891, p. 49 f.).

In New Zealand the year also began with the rising of the Pleiades. According to Maori tradition, this year (*tau*, lit. 'season') originally contained only ten months, until Whare-patari, a magician, taught the people better (cf. the curiously parallel tradition of Numa, above, p. 132[a]), after which they had the customary Polynesian number of 12 or 13: *Te-tahi* (June), *Te-rua*, *Te-toru*, *Te-wha*, *Te-rima*, *Te-ono*, *Te-whitu*, *Te-waru*, *Te-iwa*, *Te-ngahuru*, *Te-ngahuru-tahi*, *Te-ngahuru-rua*, and *Te-ngahuru-tahi-aralua* (Shortland, *Traditions and Superstitions of the New Zealanders*[2], London, 1856, pp. 219–222). These months had the following names for their days (Tregear, *Maori-Polynesian Comparative Dict.*, Wellington, 1891, p. 666, where similar lists are given for Hawaii, Tahiti, Rarotonga, and the Marquesas): *Whiro* (from *whiri*, 'twist,' 'plait,' because on this first night the moon looks like a twisted thread), *Tirea* (cf. *tirau*, 'peg,' 'stick'), *Hoata* ('long spear'), *One*, *Okou* (cf. *oko*, 'wooden bowl or other open vessel' [?]), *Tamatea-kai-ariki*, *Tamatea-ananga*, *Tamatea-aio*, *Tamatea-whakapau*, *Huna*, *Ari-roa*, *Mawharu*, *Maurea*, *Atua-whakahaehae*, *Turu*, *Rakau-nui*, *Rakau-matohi*, *Takirau*, *Oika*, *Korekore*, *Korekore-turua*, *Korekore-piri-ki-Tangaroa*, *Tangaroa-a-mua*, *Tangaroa-a-roto*, *Tangaroa-a-kiokio*, *O-Tane* (sacred to Tane), *O-Rongo-nui* (sacred to Rongo), *Mauri*, *O-Mutu*, and *Mutuwhenua* (cf. *mutu*, 'brought to an end').

In Australia, as one would expect, the lowest degree of calendrical development in the Pacific region is found. Here, in the words of Spencer-Gillen[a], p. 25 f.,

'time is counted by "sleeps" or "moons," or phases of the moon, for which they have definite terms: longer periods they reckon by means of seasons, having names for summer and winter. They have further definite words expressing particular times, such as morning before sunrise (*ingwunthaqwuntha*), . . day after to-morrow (*ingwunthairpina*), . . . in a long time (*ingwuntha arbarmaninga*).'

The citation of additional data from the remainder of the Pacific world would scarcely add new principles to the Polynesian calendar, which may be described, from the evidence already presented, as a system of lunar months (or 'moons'), 12 or 13 to what we should call a year (a concept developed only imperfectly, if at all, by the peoples under consideration), usually named according to the natural phenomena, the occupations, or the religious festivals connected with them, and—in many places subdivided into two or three periods of unequal length—having from 28 to 30 days, only roughly divided into parts (anything corresponding to the hour being quite unknown), but normally named each with a special designation—the latter being, in fact, the most striking superficial characteristic of this entire system of the reckoning of time.

LITERATURE.—Abundant references, in addition to those mentioned in the art., may be found in Waitz-Gerland, *Anthropol. der Naturvölker*, Leipzig, 1860–77, v. a, 125, b, 86, vi. 71–74, 613–615, 763 f.; Ginzel, *Handbuch der mathemat. und techn. Chronologie*, Leipzig, 1906, i. 414–432, 449.

LOUIS H. GRAY.

CALENDAR (Roman).—The ordering of time at Rome was always a matter of religious importance, and, as we may conjecture with confidence, was also from the first in the hands of religious authorities. The reason of this is to be found in the nature of Roman religious ideas. In the life of the *gens* and family on the land, before the city-State came into being, each agricultural operation had a religious side, since the *numen* or *numina* concerned with it had to be propitiated at the right time in order that they might be of service to the husbandman or might abstain from injuring him. The proper times for agricultural operations and the rites concerned with them were learnt only from the nature of the season, and from the motions of the heavenly bodies, without (as we must suppose) any systematic arrangement of them in an *annus*, or ring of the solar year. When city life began, it was naturally found necessary to have a more exact measure of this *annus* and the religious events included in it. Agriculture was still the economic basis of the life of the people; and in keeping up the agricultural religious rites within the city it was convenient, if not absolutely necessary, to fix them to particular days. This was, beyond doubt, the origin of the earliest calendar of which we know anything. In this all religious festivals are permanently fixed in date (*feriæ stativæ*); only a very few, which did not concern the State as a whole, but certain component parts of it, *e.g.* the *pagi* (Paganalia, Compitalia), and the *lustratio* of the *ager Romanus*, which had to be celebrated on the land itself, remained unfixed (*feriæ conceptivæ*).

The process of fixation is entirely lost to us. It was part of that transition from rural to city life of which we have no record, and of which archæology as yet hardly affords us a glimpse. When we begin to know anything about the Roman city-State, it is already a well-developed organization, provided with a calendar based mainly on the needs of the old agricultural life, but showing distinct signs of military and legal activity. The year, or *annus*, to which this calendar applied was probably a lunar year; its length (354 days, 8 hours, 48 minutes) nearly coincides with a lunar year of 12 months. It was itself divided into 12 months, of which March, May, July, and October had 31 days, and the rest 29, except February, which had 28. All the months had thus an odd number of days, except the last, which was mainly devoted to the care or cult of the dead, following here the world-wide superstition, especially pre-

valent in Italy, that odd numbers are lucky, even numbers unlucky. This principle held good in the calendar throughout Roman history, and all religious festivals (with two exceptions, which can be accounted for) were fixed on days of odd number.

There was, indeed, a tradition, mentioned by Censorinus (*de Die Natali*, ch. xx.), and attested, according to him, by Varro and other writers (see also Ovid, *Fasti*, i. 27 ff.; Macrobius, *Sat.* i. 123; Plutarch, *Vita Num.* xviii. f.), of a year of ten months, called the year of Romulus, which began with March and ended with December, the period between December and March being left undivided. Of such a ten-month year there are traces in Roman life, but they are not concerned so much with religion as with legal matters, such as the payment of debts and the calculation of interest. Mommsen's conjecture may be regarded as still holding the field, that it was adopted at a later period for purposes of business, to avoid the confusion which would arise, as we shall see directly, from the varying length of successive years, caused by intercalation (see his *Röm. Chronol.* p. 48 ff.). We may at any rate leave it out of account in this article. We may be fairly sure that it was not this year, but that mentioned above, ascribed by the Romans to Numa (Censorinus, xx. 4), which was the frame in which the religious festivals were fixed.

The year of 12 months = about 354¼ days must inevitably soon have called for modification. Being 11 days short of the solar year, it must before long have got out of harmony with the seasons, thus causing discrepancy between them and the dates of the religious festivals which marked agricultural operations. Such discrepancy would cause *religio*, or scruple and anxiety about the right relations between the citizens and the *numina* on whom they were dependent. The necessary adjustment was probably one of the earliest difficulties which called into existence the body of experts in religious law, who throughout Roman history had charge of the calendar, viz. the *pontifices*, and who were doubtless originally advisers of the *rex* in matters of this kind (see ROMAN RELIGION [Second Period]). Some knowledge was necessary of the methods of adjusting the solar principle to a lunar year, and it probably came from Greece (see above, p. 106 f.). There may have been a succession of such adjustments, the last of them dating from the Decemvirate, 450 B.C. (Macrob. i. 13, 21); but the Roman year, as we know it in historical times (which lasted till the revision of the calendar by Julius Cæsar), was based on a cycle of four years, of which the first had 355 days, the second 377 (obtained by an intercalation of 22 days after 23rd February [Terminalia]), the third 355, and the fourth 378. The whole number of days in the cycle was 1465, or about one day too many in each year; and the work of intercalation and occasional adjustment fell again to the *pontifices*, who, as is well known, neglected or misunderstood it, so that in the time of the late Republic the calendar was constantly out of harmony with the seasons, and all relation was lost between religion and agricultural operations.

The final adjustment was, therefore, a somewhat violent one: Cæsar and his astronomer Sosigenes extended the year 46 B.C. to 445 days, and started afresh on 1st Jan. 45 with a cycle of four years of 365 days each, to the last of which an extra day was added after the Terminalia. This cycle produced the solar year under which we still live, needing only an occasional adjustment. It brought no change in the dates of the religious festivals. Ten days were added to the old normal year of 355 days, but they were all placed at the end of months, viz. two at the end of January, August, and December; and one at the end of April, June, September, and November, so that the festivals remained, as might have been expected from Roman conservatism, even under Cæsar as dictator and pontifex maximus, exactly in the same positions which they had always occupied.

All the surviving fragments of the Roman calendar date from 31 B.C. or later, and thus represent it as revised by Cæsar (see art. ROMAN RELIGION). After that revision the official year began with the month of January, and in fact, since 153 B.C., the consuls had entered on office on the first day of that month. But it is certain that the old religious year began with March, which marks the season when all living things, man included, break into fresh activity, and which bears the name of the deity who represented at once the agricultural and the military activity of the community. The names of the second and third, and probably of the fourth month—Aprilis, Maius, Junius (mensis)—indicate the processes of Nature, viz. opening, increasing, and maturing. After this the months are named according to their order, Quinctilis (July) being the fifth after March, and so on to December. The interval between December and March was occupied by two months, Januarius and Februarius, the first of which seems to be named after the ancient deity of entrances and beginnings, Janus, perhaps indicating the natural opening of the *annus* after the winter solstice; the second takes its name from the word *februum*, an instrument of purification (see Paulus, 85, ed. Müller; Ovid, *Fasti*, ii. 19; Varro, *de Ling. Lat.* vi. 13), apparently because the festivals of the month, *e.g.* the Parentalia and Lupercalia, called for the use of such instruments. Like the Lent of the Christian calendar, this was the period in which the living were made ready for the civil and religious work of the coming year, and in which the yearly duties to the dead were performed.

The internal arrangement of each month had originally been based on the phases of the moon, and this system was maintained, for convenience of reckoning, long after all relations between these phases and the calendar had been lost. The two chief points in a lunar month are the first appearance of the moon's crescent (*Kalendæ*), and the full moon (*Idus*); between the two is the point when the moon reaches the first quarter, which is an uncertain one. It originally was the duty of the *rex*, afterwards of the *pontifices*, as soon as the new moon was discerned, to let it be known whether the first quarter was to be reckoned for the fifth or the seventh day after the Kalends (Varro, *Ling. Lat.* vi. 27), and whether the Ides were to be on the 13th or the 15th day of the month. The Ides were always on the eighth day after the first quarter, which was called *Nonæ*, according to the Roman method of counting a period so as to include both the day on which it began and that on which it ended (*Nonæ* is thus the ninth day before the Ides). All Kalends were sacred to Juno, whose connexion with the moon is beyond question (Wissowa, *Rel. und Kult. der Römer*, p. 116).

Owing to the uncertainty about the date of the Nones, there were no other religious festivals in the interval between Kalends and Nones, with the exception of the obscure Poplifugia on 5th July, nor were the Nones sacred to any particular deity. But the Ides were sacred to Juppiter as the supreme deity of the light of heaven, for on that day the two great heavenly bodies supplied continuous light during the twenty-four hours. On the Nones the *rex*, and, in the Republican period, his successor in certain religious duties, the *rex sacrorum*, announced the dates of the festivals of the month. These festivals are fully dealt with, and their religious significance explained, in art. ROMAN RELIGION. Here it will suffice to note that, like the Kalends, Nones, and Ides, they are all, with one or two exceptions which admit of a possible explanation, fixed on

days of odd number, *i.e.*, as noted above, on lucky days. This superstition is in many instances discernible also in their position with regard to each other. Where a festival occupies more than one day in a month, an interval of one or three days elapses between each celebration, making the whole number three or five. Thus Carmentalia occur on 11th and 15th Jan.; Lemuria on 9th, 11th, and 13th May; Lucaria on 19th and 21st July. In August and December we find traces of an arrangement by which different festivals, which seem to have some connexion with each other, are arranged on this principle; *e.g.* in August six festivals, all concerned in some way with the fruits of the earth and the harvest, occur on 17th, 19th, 21st, 23rd, 25th, and 27th. It has recently been suggested that *e.g.* these are arranged round one central festival, the Volcanalia on Aug. 23, which gives some kind of colouring to the rest (see von Domaszewski in *ARW* x. [1907] p. 333 ff.); and that, where this principle does not hold, we may see traces of an older system unaffected by the superstition. But, on the whole, there do not seem to be sufficient grounds for this ingenious conjecture.

A principle of greater importance for the life of the Roman people is that whereby the days of each month were divided, so to speak, between the human and the divine inhabitants of the city. In the ancient so-called calendar of Numa, distinguishable by the large capitals in which it is reproduced in the surviving calendars of the Julian era (see ROMAN RELIGION [First Period]), a letter is prefixed to each day in each month. Where this is the letter N (or NP, of which the meaning is practically the same, though its origin is uncertain [Wissowa, *op. cit.* 371]), it means that the day is made over to the gods (*nefastus dies*), and that to perform civil business on it would be a violation of *fas*, i.e. of that which is allowable under the *ius divinum*. The letters F and C, on the other hand, i.e. *fastus* and *comitialis*, indicate that such performance will be *fas*, i.e. religiously permissible. Of the 355 days of the original Roman normal year, 109 belonged to the Divine, 235 to the human, inhabitants of the city; the remaining 11 were divided between the two. Of these 11, 8 are marked EN, i.e. *endotercisus*, or 'cut into two parts'; the morning and evening being *fastus*, while the interval between the slaying of the victim and the placing of the entrails on the altar (*porrectio*) was *nefastus* (Varro, vi. 31; Macrob. i. 16. 3; and the note in the *Fasti Prænestini* for 10th Jan., believed to be the work of Verrius Flaccus). The letters Q.R.C.F. (*quando rex comitiavit fas*) occur on 24th March and 24th May, and also indicate a division of the day into sacred and profane (Fowler, *Roman Festivals*, p. 63). So, too, does the Q.St. D.F. (*quando stercus delatum fas*) of 15th June; for the explanation of this expression see Varro, vi. 32 (Fowler, *op. cit.* p. 146 ff.).

This brief account will have been sufficient to show that, as was said at the beginning of this article, the Roman calendar was based on the religious ideas of the Roman people, and mainly on the root-idea of the essential difference between the sacred and the profane, or that which legally belonged to the gods and that which belonged to man. For this reason it was in fact a part, and originally the most important part, of the *ius divinum*, or religious law, which was itself a part of the law of the State (*ius civile*); and the word by which it was known, *Fasti* (*anni Romani*), i.e. *dies fasti*, indicates that its main object was to set apart the days sacred to the deities from the days on which the citizens might go about their legal or other business. For this reason, too, the control of it was in the hands of a priestly authority, viz. the *pontifices*, after the abolition of the kingship; and for some two hundred years after that event it remained matter of their knowledge only, until the publication of the *Fasti* by the curule ædile Cn. Flavius in 304 B.C. (Livy, ix. 46). As the collegium of *pontifices* was, during this period, filled up by co-optation, it is easy to see how powerful a political influence that priestly authority must have exercised. The publication of the *Fasti* was in fact a most important step in the emancipation of the Romans from what threatened to become at one time a hierarchical oligarchy. Even after the publication, the fact that the *pontifices* had the charge of the rectification of the calendar by intercalation gave them the means of interfering unduly in political matters; and it was not until the period of the Empire, when, from 12 B.C. onwards, the Emperor was always pontifex maximus, that the calendar finally ceased to be an instrument of aristocratic intrigue and corruption.

LITERATURE.—Apart from the ancient authorities quoted above, of which the most important is Censorinus, *de Die Natali*, ch. xx., and the fragments of the calendar of the Julian era, collected with a commentary by Mommsen in vol. i. of *CIL*[2], p. 297 ff., the following works may be mentioned as necessary for the study of the subject: Th. Mommsen, *Röm. Chronol. bis auf Cæsar*, Berlin, 1859; A. Bouché-Leclercq, *Les Pontifes*, Paris, 1871, pp. 113 ff., 227 ff.; J. Marquardt, *Röm. Staatsverwaltung* (ed. Wissowa, Leipzig, 1885), p. 281 ff.; H. Matzat, *Röm. Chronol.*, Berlin, 1883–84. Succinct accounts will be found also in Smith, *Dict. of Gr.-Rom. Ant.*[3], London, 1890, vol. i. p. 340 ff.; and in the Introd. to the *Roman Festivals of the Period of the Republic*, London, 1899, by W. Warde Fowler. The introduction to H. Peter's edition of the *Fasti* of Ovid (Leipzig, 1874) also contains a useful account. On all points connected with the religious aspect of the calendar, reference should be made to G. Wissowa, *Religion und Kultus der Römer*, which appeared in 1902, *i.e.* later than any of the works mentioned above. W. WARDE FOWLER.

CALENDAR (Siamese).—As a result of the constant interconrse between Cambodia and Siam, and of their having the same religion and civilization, the Siamese calendar is almost exactly the same as that of the Khmers (see CALENDAR [Indo-Chinese], II.). As in Cambodia, so in Siam three eras of Hindu origin are used, along with three cycles of Chinese provenance.

1. Eras.—The three eras usually employed by the Siamese are the following: (1) the religious era, or the era of the Buddha (*phŭtthăsăkkărăt* = Skr. *buddhaśakarāja*),[1] which begins at full moon, May 543 B.C.; (2) the great era (*ma:hásăkkărăt* = Skr. *mahāśakarāja*); this is the Hindu *śaka* era, established in A.D. 78, which used often to be employed in official and historical documents; (3) the lesser era (*chŭlăsăkkărăt* = Pāli *chullasakarāja*), beginning with the year 638 B.C., and whose exact commencement has been fixed by the astronomer Dominic Cassini. This is the civil era, which has not yet been supplanted in everyday usage by the new era (see below, §7).

In addition to these three eras, only two of which —the religious and the lesser—are in current use, the present king, wishing to give his country a calendar in agreement with the European calendar, introduced a new era, on 1st April 1889, called *răttănăkōsĭnsŏk*, or *răttănă kōsĭnthără* (or *kōsĭn*) *săkărăt* (Skr. *ratnakośendraśakarāja*), 'era of Indra's casket of pearls.' It begins at the time when the capital of Siam, formerly established at Ayuthia, was transferred to Bangkok, *i.e.* 1st April 1781.

We may mention, in passing, two eras that are met with in the astrological writings of the Brāhmans. The one, called *ŏn xa:na:sŏnti*, begins in 643 B.C., *i.e.* 100 years before the religious era; the other, called *xa:nathĭp*, starts 86 years before the same era, *i.e.* in 629 B.C.

2. Cycles.—These are the same as in Cambodia.

[1] This era is also called *phŭtthăsāttsănăkan*, 'era of the religion of the Buddha.'

The following are the names of the animals of the duodenary cycle (the Siamese do not, any more than the Khmers, give them native names): *xuèt*, 'rat'; *xălu*, 'ox'; *khar*, 'tiger'; *tho*, 'hare'; *ma:rōng*, 'great dragon' or 'dragon'; *ma:sĕng*, 'little dragon' or 'serpent'; *ma:mia*, 'mare' or 'horse'; *ma:mĕ*, 'goat'; *vòk*, 'monkey'; *ra:ka*, 'cock'; *cho*, 'dog'; *kŭn*, 'pig.'[1] These words bear a very close resemblance to those used by the Khmers to denote the twelve animals of the cycle, and probably they have the same linguistic origin.

As happens among the Chinese, Annamese, and Cambodians, the duodenary cycle is combined five times with the denary cycle. These two cycles, called minor cycles, when counted concurrently and repeated as often as is necessary—in such a way that the last year of the denary cycle coincides with the last year of the duodenary, a coincidence which occurs at the end of 60 years—form the major cycle.

The years of the denary cycle are denoted by ordinal numbers borrowed from Pāli: *ēkasŏk* (P. *ekasaka*), 1st year; *thôsŏk* (Skr. **dosaka*), 2nd year; *trisŏk* (P. *trisaka*), 3rd year; *chăttŭsŏk* (P. *chatusaka*), 4th year; *bĕnchasŏk* (P. *pañchasaka*), 5th year; *xósŏk* (P. *chhasaka*), 6th year; *săttasŏk* (P. *sattasaka*), 7th year; *ătthasŏk* (P. *aṭṭhasaka*), 8th year; *nă:vasŏk* (P. *navasaka*), 9th year; *săm-rŭtthisŏk* (Skr. *samṛddhiśaka*), year of completion, last year.

3. Year and months. — The Siamese year is lunar; the months have twenty-nine and thirty days (or rather 'nights') alternately, and are generally denoted by ordinal numbers: *du'en nŭ'ng*, 'first month'; *d. sóng*, 'second month'; *d. sám*, 'third month,' etc. They have also Indian names: (1) *chĭtra:màt* (Skr. *chaitra*; P. *chitto* [Siam. *màt* = Skr. *māsa*, 'month']); (2) *vísákha:màt* (Skr. *vaiśākha*; P. *vesākho*); (3) *xètha:màt* (Skr. *jyeṣṭha*; P. *jeṭṭho*); (4) *asátha:màt* (Skr. *āṣāḍha*; P. *āsāḷho*); (5) *savăna:màt* (Skr. *śrāvaṇa*; P. *sāvaṇo*); (6) *phŏthraba:màt* (Skr. *bhādrapada*; P. *poṭṭhapādo*); (7) *asŭxa:màt* (Skr. *āśvayuj*; P. *assayujo*); (8) *katika:màt* (Skr. *kārttika*; P. *kattiko*); (9) *mĭkhosira:màt* (Skr. *mārgaśirṣa*; P. *māgasiro*); (10) *busoja:màt* (Skr. *pauṣa*; P. *phusso*); (11) *makha:màt* (Skr. and P. *māgha*); (12) *phokhŭna:màt* (Skr. *phālguna*; P. *phagguno*).

The months with 29 days (odd: 1st, 3rd, 5th, etc.) are called *du'en khăt*, 'defective months'; those with 30 days (even: 2nd, 4th, 6th, etc.) have the name of *d. thuên*, 'complete months.'

Each month is divided into two fortnights: the clear fortnight, or fortnight of the waxing moon (*khàng khŭ'n*, 'waxing moon'), from new moon to full moon; and the dark fortnight (*khàng rĕm*, 'waning moon'), from full to new moon. In official and exact writings, these fortnights are often divided into *sŭk pòkos* (Pāli *pakāso*, 'light,' 'lustre'), 'bright half'; and *kala pòkos*, 'dark half,' as also takes place in India.

As regards the practice of beginning the year in *Vísákha* (April–May), of adding an intercalary month every two or three years so that seven intercalary months are introduced in a period of 19 years, and of increasing by a supplementary day the month preceding the commencement of the *vasso*, or Buddhist retreat, *i.e.* towards July, everything takes place exactly as in Cambodia. The intercalary year, which is called *pi a:thĭka:màt* (Skr. *adhikamāsa*, 'intercalary month'), has 384 days or 13 months; it makes the agreement of the lunar and solar years possible by bringing the rotation of the seasons into regularity.

[1] Several official documents employ Pāli names for these animals: *mūsiko, usabho, vyaggho, saso, nāgo, sappo, asso, ajako, makkaṭo, kukuṭo, soṇo, sūkaro.*

4. Days.—In Siam, as in Cambodia, the names given to the days are Indian in origin: *văn athĭt* (Siam. *văn*, 'day'; Skr. *āditya*), 'Sunday'; *văn chăn* (Skr. *chandra*), 'Monday'; *văn ăngkhan* (Skr. *aṅgāraka*), 'Tuesday'; *văn phŭt* (Skr. *budha*), 'Wednesday'; *văn prā:hăt* (Skr. *bṛhaspati*), 'Thursday'; *văn sŭk* (Skr. *śukra*), 'Friday'; *văn săo* (Skr. *śanaiśchara*), 'Saturday.'

5. Hours.—The hours (*nalĭka* = Skr. *nāḍikā*) are divided into hours of day (*mông*) and hours of night (*thŭm*). The hour is subdivided into 10 *bāt*, the *bāt* into 6 (formerly 4) *nathi* (Skr. *nāḍikā*, '60th part of the sidereal day,' or Indian hour), the *nathi* into 60 *vinathi* (Skr. *vināḍī*, '$\frac{1}{60}$ *nāḍikā*'), or 15 *phexanathi*. But this old method of measuring hours is giving way more and more to the European system of the hour equal to 60 *mĭnit* (Eng. 'minute'); the word *bāt*, besides, has now got the current meaning of 'quarter of an hour, 15 minutes.' The day-hours are from 6 a.m. to 6 p.m.; the night-hours, from 6 p.m. to 6 a.m., form four watches, or *jam* (cf. Khmer *yām*), each of three hours' duration.

6. Seasons.—There are three seasons (*ra:du, rădu* = Skr. *ṛtu*): (1) *ra:du ron*, the warm season, from March to the middle of May; (2) *ra:du fŏn*, the rainy season, from May to the end of October; (3) *ra:du náo*, the cold season, from November to February. In the literature we find also the following names for these seasons: (1) *khĭmhănta: ra:du* (P. *gimhāna*, 'warm season'); (2) *va:-sănta:ra:du* (P. *vasanto*, 'spring'); (3) *hĕmanta: ra:du* (P. *hemanto*, 'cold season').

7. The new era.—As we have seen, the new era, or *răttănakōsĭnsŏk*, in use in Siam is based on the European era. The names of the months are taken from the signs of the zodiac. The list is as follows: (1) *mesajŏn* (Skr. *meṣa*, 'Aries'), April; (2) *phrŭtsaphakŏm* (Skr. *vṛṣa*, 'Taurus'), May; (3) *mĭthŭnajŏn* (Skr. *mithuna*, 'Gemini'), June; (4) *kărăkădakhŏm* (Skr. *karka*, 'Cancer'), July; (5) *sĭnghakhŏm* (Skr. *siṃha*, 'Leo'), August; (6) *kănjajŏn* (Skr. *kanyā*, 'Virgo'), September; (7) *tŭlakhŏm* (Skr. *tulā*, 'Libra'), October; (8) *pru'tchĭ-kajŏn* (Skr. *vṛśchika*, 'Scorpio'), November; (9) *thănvakhŏm* (Skr. *dhanu*, 'Sagittarius'), December; (10) *măkărakhŏm* (Skr. *makara*, 'Capricornus'), January; (11) *kŭmphaphăn* (Skr. *kumbha*, 'Aquarius'), February; (12) *mĭnakhŏm* (Skr. *mīna*, 'Pisces'), March.[1] This solar, or rather stellar, year begins in April, and, as in Cambodia, the passing of one sign of the zodiac into the next that marks the beginning of the new year is called *mahásŏngkrānt* (= Skr. *mahāsaṃkrānti*, 'great passage').

LITERATURE.—S. de La Loubère, *Du royaume de Siam*, Paris, 1691, vol. ii. pp. 74–80, 142; J. B. Pallegoix, *Dict. siamois-français-anglais*, revised by J. L. Vey, Bangkok, 1896, pp. 24 ff., 47 ff.; F. J. Wershoven, *Lehr- und Lesebuch der siam. Sprache*, Vienna, 1892; *Elements of Siamese Grammar*, with appendixes by O. Frankfurter, Bangkok, 1900; Ed. Lorgeou, *Grammaire siamoise*, Paris, 1902, p. 153 ff. F. K. Ginzel, *Handbuch der mathematischen und technischen Chronologie*, Leipzig, 1906, i. 409–413.

ANTOINE CABATON.

CALENDAR (Slavic).—Of all the Indo-Germanic calendars, that of the Balto-Slavs was unquestionably the least developed. Yet, for this very reason, it possesses a peculiar interest, for it is well known that the pagan Balto-Slavs preserved in many respects the most primitive conditions of Indo-Germanic times (cf. art. ARYAN RELIGION, *passim*). If we seek for analogical, though of course entirely independent, parallels outside the Indo-Germanic region, we may perhaps find them among some of the Polynesian peoples (cf. CALENDAR [Polynesian]), while within the

[1] The terminations *khŏm* (Skr. *gama*, 'going'), *jŏn* (Skr. *yāna*, 'going'), *phăn* (Skr. *bandha*, 'binding'), mean 'to enter into conjunction.'

Indo-Germanic race much may be gleaned from the Teutonic calendar (*q.v.*).

1. There appears to be no record of anything like an era among the Balto-Slavs, or any system of enumerating by a series of years. Nevertheless, the year and the seasons were well known. The year was named *godŭ* (lit. 'time' [cf. Miklosich, *Etymolog. Wörterb. der slav. Sprachen*, Vienna, 1886, p. 61 f.; Berneker, *Slav. etymolog. Wörterb.*, Heidelberg, 1908 ff., pp. 316–318) among the Slavs, and *metas* (lit. 'time' [cf. Old Pruss. *mettan*, 'year,' Albanian *mot*, 'year,' 'weather,' Schrader, *Reallex. der indogerm. Altertumskunde*, Strassburg, 1901, p. 390]) among the Lithuanians. At least four seasons have distinct names.[1]

Spring bears the name *vesna* in O. Church Slav. (cognate with Skr. *vasanta*, Gr. ἔαρ, 'spring,' Lith. *vasarà*, 'summer,' Skr. *vas*, 'shine,' etc. [see Schrader, pp. 258, 394]), and also, as in Slovenian, Czech, and Polish, the name *yar* (cognate with Eng. *year* [Miklosich, p. 100; Schrader, pp. 258, 395]). Summer was *lěto* (connected probably with Lith. *lytùs*, Lett. *lētus*, 'rain,' or possibly with Anglo-Sax. *Líða*, 'June–July' [cf. CALENDAR (Teutonic); and see Schrader, p. 782; Miklosich, p. 167]) in O. Church Slav., *vasarà* in Lith., and *dagis* (cf. Lith. *dãgas*, 'harvest,' Skr. *nidāgha*, 'heat,' 'summer,' *dah*, 'burn,' Goth. *dags*, 'day' [Schrader, pp. 782, 845]) in O. Prussian. Autumn was *yesenĭ* in O. Church Slav., *assanis* in O. Pruss. (both cognate with Goth. *asans*, 'summer,' O.H. Germ. *aran*, 'harvest'), and *rudŭ* (cognate with Lith. *rùdas*, 'reddish-brown' [because of the colour of the leaves]) in Lith. (Schrader, p. 367). Winter was *zima* in O. Church Slav., *žiemà* in Lith., *sima* in Lett., and *semo* in O. Pruss. (all cognate with Skr. *hemantá*, Gr. χειμών, Irish *gam*, 'winter' [Schrader, p. 958]); and a special name for the season immediately preceding winter is implied in the Czech word *podzimí* and the Sloven. *prědzima*, 'pre-winter' (Schrader, p. 367).

2. It is in their names for the months (O. Church Slav. *měsęci*, 'moon,' 'month,' Lith. *mėnesis*, *mėnu*, 'moon,' 'month' [other Balto-Slavic words are given by Miklosich, p. 195], all cognate with the Indo-Germ. term for 'moon') that the Balto-Slavs display a wealth of nomenclature that is paralleled only by such primitive calendars as the Teutonic and Polynesian. To this subject a most valuable study has been contributed by Miklosich, in his 'Slavonische Monatsnamen' (*DWAW* xvii. [1868]), in which he makes a sixfold classification, though only the first four classes concern us here, the month-names based on religious feasts being without exception of Christian origin among the Balto-Slavs, and those derived from numerical sequence (such as Goth. *Fruma Jiuleis*, 'November' [lit. 'first Yule-month']) not being represented in the Balto-Slavic calendar. The remaining four groups are: from plants, from animals, from natural phenomena, and from the operations of agriculture. These month-names, however, did not apply to months in the strict sense of the term until after the Roman period. Originally they denoted merely general seasons of the year, as is obvious both from their meanings and from the fact that the same name is given by different Balto-Slavic peoples to different months, sometimes separated by a considerable interval of time.

The length of the Balto-Slavic month is quite uncertain; though perhaps there is some survival of primitive conditions in the practice of the modern Huzuls, who in many places reckon 30 days to all their months except the last (March), which has 33, their year thus having 363 days (Kaluzniacki, *Archiv für slav. Philologie*, xxvii. 271). But among large numbers of the Balto-Slavic peoples calendrical reckoning is still in a most backward state; and the writer is informed by Mr. Hermann Rosenthal, Chief of the Russian Department of the New York Public Library, that he has seen in northern Russia the walls of a peasant's hut covered with notches made to indicate the passage of the days.

Some idea of the richness of Balto-Slavic nomenclature for the months may perhaps be gained from the following selection from the study of Miklosich just mentioned, the arrangement hers being in the ordinary sequence of the Julian calendar, instead of according to etymological derivation, as in Miklosich.

January: O. Church Slav. *Prosinĭtel*, Sloven. *Prosinec*, Croat. *Prosinac* ('time of increasing day-light'); Sloven. *Sečen*, Serb. *Syečani* ('[wood-]cutting time'); Sloven. *Zimac*, Lett. *Zēmas mēnesis* ('winter month'); Czech *Hruden* ('clod month'), or *Leden* ('ice time').

February: O. Church Slav. *Sěčenŭ*, Bulg. *Sečka*, Croat. *Sičen* ('[wood-]cutting time'); Little Russ. *L'utyi*, Pol. *Luty*, Huz. *Lutyi* ('rigid [with cold]'); Czech *Únor*, *Ounor* ('melting or breaking up [of ice]'); Russ. *Bokogrĕi* ('side-warming' [the cattle leaving their stalls to warm themselves in the open air]); Lith. *Kovìnis* ('month of jackdaws').

March: O. Church Slav. *Suchyi*, Sloven. *Sušec*, Croat. *Sušac* ('dry month' [when land can be ploughed]); O. Church Slav. *Lŭzuyek*, Bulg. *Lazu*, Serb. *Ozuyak* ('treacherous'); Lith. *Karvėlinis mėnu*, Lett. *Baloschu mēnesis* ('dove month' [when the doves go from the woods to the fields]); Sloven. *Brězen*, Little Russ. *Berezozol* ('month of the birch tree').

April: O. Church Slav. *Brězinŭ*, Little Russ. *Berezen*, Huz. *Berezeni* ('month of the birch tree'); O. Church Slav. *Berezozolŭ* ('shedding birch sap'); Lith. *Sùltekis* ('flowing of birch sap'); Lett. *Sulu mēnesis* ('month of birch sap'); Croat. *Cvitani* ('flower month'); Czech *Duben* ('oak month'); Serb. *Travani* ('grass month'); Lith. *Gegužìnis* ('cuckoo month').

May: O. Church Slav. *Travinĭ*, Little Russ. *Traveń*, Huz. *Traveni*, Czech *Tráven* ('grass month'); Sloven. *Cvĕten* ('flower month'), *Sviban* ('cornel month'), and *Žoltopušnik* ('yellow month'); dialectic Russ. *Murŭ* ('grass month'); Upper Sorb. *Rozcve* ('rose bloom'); Ruthen. *Yareš* ('spring month'); Lith. *Berzelis* ('birch month'); Lett. *Sēyu mēnesis* ('seed month').

June: O. Church Slav. *Izokŭ* ('grasshopper time'); Sloven. *Prašnik*, Upper Sorb. *Smaznik*, Lith. *Pùdimo menu*, Lett. *Papuēs mēnesis* ('fallow month'); Sloven. *Bobov cvĕt* ('bean bloom'), *Klasen* ('ear month'), *Mlĕčen* ('milk month'); Sloven. *Lipan*, Serb. *Lipani* ('linden month'); Sloven. *Rozen cvĕt*, Czech *Ruzen* ('rose bloom'); Bulg. *Crŭvenik*, Little Russ. *Červen* ('time for gathering the *Coccus polonicus*' [for the preparation of a red dye]); Bulg. *Sĕnokos* ('hay month'); Serb. *Svibtnī* ('cornel month') and *Črĕšnyarŭ* ('cherry month'); Lith. *Sėlynis* ('seed month'); Lett. *Zēdu mēnesis* ('month of flowers').

July: O. Church Slav. *Srŭpinŭ*, Sloven. *Srpen*, Serb. *Srpani* ('sickle time'); O. Church Slav. *Črŭvinŭ* ('time for gathering the *Coccus polonicus*'); Russ. *Sĕnozornik*, Lett. *Sēnu mēnesis* ('hay month'); Serb. *Žar*, Bulg. *Goreśnikŭt* ('hot month'); Lower Sorb. *Žnoiski* ('harvest month'); Serb. *Lipŝtak*, Little Russ. *Lypeć*, *Lypeń*, Lith. *Lėpos mėnu*, Lett. *Lēpu mēnesis* ('linden month').

August: O. Church Slav. *Zarevŭ* ('beginning of bellowing' [of stags, etc.]); Russ. *Zorničnikŭ*, Croat. *Zrilivoća* ('ripening'); Little Russ. *Serpeń*, Czech *Srpen* ('sickle time'); Sloven. *Kolovoz* ('time for going with waggons'); Upper Sorb. *Žńeńc*, Lower Sorb. *Yacmański*, Lith. *Piūmenė*, Lett. *Labbibas mēnesis* ('harvest month'); Little Russ. *Kyven* ('fly month'); Lith. *Rugpiūtė*, Lett. *Ruzdu mēnesis* ('rye month'); Lith. *Degėsis* ('hot month'); Lett. *Suńu mēnesis* ('dog month').

September: O. Church Slav. *Vrĕsĭnĭ*, Little Russ. *Vereseń*, Pol. *Wrzesień*, Czech *Vresen*, Lett. *Sīlu mēnesis* ('heather month'); O. Church Slav. *Ryuyinŭ*, Serb. *Ruyan*, Czech *Zárí*, Lith. *Rùgis* ('rutting month'); Russ. *Osenĭ*, Sloven. *Yesenik* ('autumn month'); Sloven. *Kimavec* ('fly month'); Slovac. *Hruden* ('clod month'); Little Russ. *Babyne l'ito*, Pol. *Babie lato* ('old woman's summer'); Little Russ. *Siven* ('seed month').

October: O. Church Slav. *Listopadŭ*, Serb. *Listopad*, Huz. *Padolyst*, Lith. *Lapkrìstis*, Lett. *Lapu mēnesis* ('month of falling leaves'): Little Russ. *Zolten*, Lith. *Ruduõis*, Lett. *Rudens mēnesis* ('yellow month'); Sloven. *Vinotok*, Lower Sorb. *Viński myasec* ('wine month'); Russ. *Gryaznikŭ* ('time when the roads become usable'); Sloven. *Obročnik* ('hoop month').

November: O. Church Slav. *Grudĭnŭ*, Russ. *Grudenĭ*, Huz. *Hrudeni* ('clod month'); Sloven. and Pol. *Listopad*, Little Russ. *Lystopad* ('month of falling leaves'); Serb. *Studeni* ('cold month').

December: O. Church Slav., Russ., Little Russ. *Studenŭ*, Pol. *Styczen* ('cold month'); Czech *Vlčenec*, Upper Sorb. *Vyelki měsac*, Lett. *Vilku mēnesis* ('wolf month'); Little Russ

[1] The contention of Schrader, pp. 394–397, that the Indo-Germanic peoples knew of only three seasons, seems to the writer scarcely proven, especially as the theory is based solely on the *argumentum e silentio* (cf., further, Hirt, *Indogermanen*, Strassburg, 1907, pp. 542, 749).

Trusym, Lett. *Putenu mēnesis* ('month of snow drifts'); Serb. *Prosinac*, Czech *Prosinec*, Huz. *Prosynec* ('time of increasing daylight'); Sloven. and Croat. *Gruden*, Lith. *Gródinis* ('clod month'); Russ. *Solnovorotŭ* ('[wioter] solstice'); Lower Sorb. *Zymski* ('winter month'); Lith. *Sausis* ('dry [frost] month'), and *Sékis* ('[wood-]cutting time').

It will be obvious, from the examples just given, that many month-names are applied by the Balto-Slavs to different months of the Julian calendar. Thus, the 'birch month' may be March (Sloven. *Brězen*), April (O. Church Slav. *Brězinŭ*), or May (Lith. *Bcrzēlis*); the 'flower month' may be April (Croat. *Cvitani*), May (Sloven. *Cvěten*), or June (Lett. *Zēdu mēnesis*); the 'yellow month' may be May (Sloven. *Zoltopušnik*) or October (Little Russ. *Zolten*); and the 'clod month' may be September (Slovac. *Hruden*), November (Huz. *Hrudeni*), December (Lith. *Gródinis*), or January (Czech *Hruden*).

3. The Balto-Slavic calendar originally had nothing corresponding to the week, the names for which properly mean 'Sunday' (O. Church Slav. *Nedělya*, Lith. *Nedělė* [lit. 'day on which nothing is done'], O. Pruss. *Sawaite* [perhaps a loan-word from Gr. *σάββατον*]). The days of the week, which here begins with Monday, were numbered, in conformity with ecclesiastical usage, instead of being named, as in the Teutonic and other calendars. Thus the Lithuanian designations of the days of the week, which are here perfectly typical of the whole Balto-Slavic system, are as follows: Sunday, *Nedělė* ('day on which nothing is done'); Monday, *Panedielis* ('day after Sunday'); Tuesday, *Utárninkas* ('second day'); Wednesday, *Seredà* ('heart' [*i.e.* middle of the week]); Thursday, *Ketvergas* ('fourth day'); Friday, *Pětnyczia* ('fifth day'); Saturday, *Subatà* ('Sabbath'). For further details, see Schrader, pp. 963–965; Miklosich, 'Christliche Terminologie der slav. Sprachen,' in *DWAW* xxiv. [1876], pp. 19–21, where it is held that the Balto-Slavs borrowed their calendar through the Germanic peoples in Pannonia.

4. The Balto-Slavs divided their day (O. Church Slav. *dĭnĭ*, Lith. *dėnà*, cognate with Skr. *dina*, 'day' [for further cognates, see Berneker, p. 253 f.]) into at least four parts: dawn, morning (Lith. *auszrà*, O. Pruss. *angstainai*; cf. Schrader, p. 559); noon (Lith. *piĕtūs*; cf. Schrader, p. 2); evening (O. Church Slav. *večerŭ*, Lith. *vākaras*, O. Pruss. *bītai*; cf. Schrader, p. 1 f.); and night (O. Church Slav. *noštĭ*, Lith. *naktis*; cf. Schrader, p. 569); and they were early acquainted with some sort of hour, as shown by O. Church Slav. *časŭ*, 'hour' (properly 'time'; cf. the cognate O. Pruss. *kīsman*, 'time,' Alban. *kohε*, 'time,' 'weather' [for further cognates, see Berneker, p. 137]).

Among the Russian peasants certain days receive special names. Thus Jan. 16 (the Feast of St. Peter's Chains in the Eastern Church) is called 'Peter Half-Food,' because by that time half the winter store of food has been consumed; Jan. 18 (the Feast of SS. Athanasius and Cyril) is 'Athanasius Break-Nose' (the cold then being so intense as to freeze the nose stiff); Jan. 22 (the Feast of St. Timothy) is 'Timothy Half-Winter'; Feb. 2 is 'Meeting Day' (when winter and summer are supposed to meet); Apr. 12 is 'Take the Waggons out'; May 2 is 'Nightingale Day'; June 13 is 'Buckwheat Day' (this grain then being sown), etc. Many foreign words receive folk-etymologies in this connexion, as when Russ. *Martŭ*, 'March' (a loan-word from Lat. *Martius*) is thus associated with *maritĭ*, 'to burn' (of the sun), because in that month the sun begins to burn the earth (for abundance of further examples, see Afanasĭev, *Poetič. vozzr. Slavyan na prirodu* ['Poetic Views of the Slavs on Nature'], Moscow, 1869, iii. 670–675).

The months and seasons play some part in Slavic folk-tales. According to a White Russian tradition, spring is a young and most beautiful maiden; summer, a sensually lovely woman; autumn, a lean and elderly man, three-eyed, and with unkempt and bushy hair; and winter, an aged man, with white hair, a long grey beard, barefooted and bareheaded, clad in white, and bearing an iron club (Krek, *Einleitung in die slavische Literaturgeschichte*[2], Graz, 1887, p. 519, with a reference to Afanasĭev, *op. cit.* iii. 676–682).

A folk-tale 'of the twelve months,' of rather exceptional interest in this connexion, is recorded by Wenzig, *Westslaw. Märchenschatz*, Leipzig, 1857, pp. 20–26. A certain woman had a daughter named Holena, as hateful in soul as in body, and a stepdaughter named Marushka, as good as she was beautiful. In the depths of the ice-month (December), Marushka was compelled by Holena, under threat of being killed if unsuccessful, to fetch her violets. After much wandering, Marushka saw a light in the distance, and, following this, she 'comes to the top of the hill. Here a great fire burns, about the fire are twelve stones, on the stones sit twelve men. Three were grey-bearded, three were younger, three were still younger, and the three youngest were the handsomest. They spoke not; they looked silently into the fire. The Ice-Mouth sat at the head; he had hair and beard white as snow. In his hand he held a staff.' Marushka conducted herself with the utmost respect for these personages, and, on learning of her quest, 'the Ice-Month rose, went to the youngest month, put the staff in his hand, and said: "Brother March, sit at the head." March took his seat at the head, and swung the staff over the fire. On the instant the fire flamed higher, the snow began to melt, the trees dropped down buds,' and at the bidding of March, Marushka plucked the violets for which she had been sent, after which she politely thanked the months and returned to her wretched home. Soon, however, the cruel Holena sent her out again, this time for strawberries. Now it was June, the *vis-à-vis* of the Ice-Month, to whom the staff was given. A third time Marushka was sent for apples, and the Ice-Month gave the staff to September. By this time Holena, angered beyond measure by Marushka's success in her impossible tasks, herself set forth; but she displayed the utmost insolence to the months, whereupon 'the Ice-Month frowned and swung the staff over his head. Instantly the heaven was darkened, the fire burned low, snow began to fall as though a feather-bed were shaken out, and a biting wind blew through the wood,' all causing the death of the wicked Holena, and ultimately of her equally evil mother, while Marushka 'lived happily ever afterward.'

In this story the hill is plainly the sky; the fire is the sun, which is warmer or cooler according to the various months of the year; and perhaps there may be a covert moral that the powerful seasons are to be treated with respect, or disaster will follow.

LITERATURE.—This has been given in the course of the article, and further references may be found in Krek, *Einleit. in die slav. Literaturgesch.*[2], Graz, 1887, pp. 510–520.

LOUIS H. GRAY.

CALENDAR (Teutonic).—For the earliest and fullest account which we possess of any native Teutonic calendar we are indebted to Bede's treatise, *de Temporum Ratione* (ch. 15). Bede says that in former times the Angli calculated their months according to the course of the moon, whence the name (A.-S. *mónaþ*, from *móna*).[1] The months individually bore the following names:

Jan. *Giuli.*	May, *Thrimilci.*	Sept. *Halegmonath.*
Feb. *Solmonath.*	June, *Lida.*	Oct. *Winterfylleth.*
Mar. *Rhedmonath.*	July, *Lida.*	Nov. *Blotmonath.*
Apr. *Eosturmonath.*	Aug. *Weodmonath.*	Dec. *Giuli.*

The meaning of these names was as follows. The months called *Giuli* derived their name *a conuersione solis in auctum diei*, since one preceded the solstice and the other followed it. *Solmonath* denoted 'month of cakes,' which they used to offer at that time to their gods. *Rhedmonath* and *Eosturmonath* derived their names from two goddesses, *Rheda* (*Hreð*?) and *Eostre* (*Eastre*), to whom sacrifices were offered in these months. *Thrimilci* was so called because at that time the cattle were milked thrice a day, 'for such was once the fertility of Britain, or of Germany, from whence the English nation came to Britain.' *Lida* (*Liða*) meant *blandus siue nauigabilis*; *Weodmonath*, 'month of tares,' which were then most abundant; *Halegmonath* was *mensis sacrorum*. *Winterfylleth* might be rendered by the coined word *hiemiplenium*. *Blotmonath* denoted *mensis immolationum*, because they then devoted to their gods the live stock which they were going to slaughter.

The year began on Dec. 25, and that night (probably the preceding night) was called *Modraniht* ('night of the mothers'), on account (so

[1] Reference may also be made to the Anglo-Saxon menology of the Vercelli MS (ed. Wülker, *Bibliothek der angelsächsischen Poesie*, Leipzig, 1894, ii. 282–293).

Bede suspected) of certain ceremonies which they observed. In ordinary years three months were reckoned to each season; but when there was an intercalation—it is not stated how often this took place—the extra month was added to summer. Such a year was called *Thrilidi*, because the name Lida was then borne by three months. Another and more customary division of the year was into two seasons, winter and summer, calculated according to the relative length of the nights and days. The first month of winter (*Winterfylleth*) acquired its name, which was a compound of 'winter' and 'full moon,' from the fact that winter was reckoned to begin from the full moon of that month.

Some modern writers have taken exception to this account, on the ground that it presents an impossible combination of solar and lunar reckoning. The explanation, however, may be that the solar reckoning had begun to encroach on the other before the adoption of Christianity. Originally the year may have begun with the interlunium nearest to the winter solstice. The word *Giuli* is clearly related to the A.-S. name for Christmas, *Geohhol*, *Géol*, 'Yule.' In a fragment of a Gothic calendar, dating probably from the 6th cent., we find *Naubaimbair*: *fruma Jiuleis* (*i.e.* 'the first Jiuleis'), which is the exact Gothic equivalent of the same word. Here also the name seems to have been given to more than one month (*aftuma Jiuleis*, 'the second Jiuleis,' probably being the name of Dec.), though apparently these months were Nov. and Dec., instead of Dec. and Jan.—a discrepancy which is due probably to the difficulty of equating lunar months with divisions of the Roman (solar) year.

Later English authorities show comparatively few variations from the list of month-names given by Bede. Dec. and Jan. are distinguished as *se ærra Géola* and *se æftera Géola* respectively, as in Gothic; and a similar distinction is made between the two months called *Líða*. We find also *Hlyda* for March, *Séarmónaþ* ('dry-month') for June, *Hærfestmónaþ* ('harvest-month') and *Rugern* (probably 'rye-harvest') for September, and *Iulmónaþ* (Yule-month') for December.

The earliest Continental reference is a passage in Einhard's *Vita Caroli Magni* (ch. 29), where Charlemagne is said to have fixed German names for the months. Before his time they were called partly by Latin and partly by native names. The authorized list was as follows:

1. *Wintarmanoth.*	5. *Winnemanoth.*	9. *Witumanoth.*
2. *Hornung.*	6. *Brachmanoth.*	10. *Windumemanoth.*
3. *Lenzinmanoth.*	7. *Hewimanoth.*	11. *Herbistmanoth.*
4. *Ostarmanoth.*	8. *Aranmanoth.*	12. *Heilagmanoth.*

For *Hornung* we find in later times *der kleine Horn*, and so also *der grosse Horn* for January. The name is probably connected with O. Norse *hiarn*, 'frozen snow.' *Ostarmanoth* corresponds to the Anglo-Saxon name for April, but *Herbistm.* and *Heilagm.* to the two Anglo-Saxon names for September. *Lenzinm.*, *Winnem.*, *Brachm.*, *Hewim.*, *Aranm.*, *Witum.*, and *Windumem.* appear to mean 'spring-month,' 'pasture-month,' 'fallow-month,' 'hay-month,' 'reaping-month,' 'wood-month,' and 'grape-gathering-month' respectively.

Among German-speaking peoples in later times the Latin names appear to have been almost exclusively used for March, April, May, and August, in many districts also for January. The other names in common use were: for Jan. *Hartmonet* ('sharp-month') and several others; for Feb. *Hornung*, etc., and *Sporkel*, the latter word probably being borrowed from mediæval Latin *spurcalis*, 'Shrove Tuesday,' in allusion to the merriment, often very questionable, which characterized this day, especially as the *Indiculus Superstitionum* (8th cent.) has a notice *de Spurcalibus in Febr uario*. For June we find *Brachmanet*, *Brachot*, or 'second May' (*ander Meije*, etc.); for July *Houmanet*, *Houwot*, or *Hundemaen*; for Sept. *Herbest*, or 'second August' (*ander Ougest*, etc.); for Oct. *Winmanet* ('wine-month'), *Herbest*, or *ander Herbest*; for Nov. *Wintermanet*, *erste Wintcrm.*, *dritta Herbest*, *Louprise* ('fall of the leaf'), *Wolfm.*, *Hälcgm.* etc.; for Dec. *Wintermanet*, *ander Wintcrm.*, *Hartm.* etc.

Concerning the form of calendar which prevailed in Germany in heathen times we have no definite information; but the fact that several of the above names are applied to different Roman months perhaps suggests that they originally denoted lunar months.

The month-names used in the Netherlands, both now and in the past, differ somewhat from the German. The following are the commonest varieties: (1) *Louwmaand* (meaning doubtful), *Hardm.*; (2) *Sprokkelmaand*, *Sporkel*, *Sille* (the latter unexplained); (3) *Lentemaand*; (4) *Grasmaand* ('grass-month'); (5) *Bloeimaand* ('blossom-month'), etc.; (6) *Zomermaand* ('summer-month'), *Braakm.* etc.; (7) *Hooimaand*, etc.; (8) *Oogstmaand*, etc.; (9) *Herfstmaand*, *Evenmaand* ('oats-month'?); (10) *Wijnmaand*, etc.; (11) *Slagtmaand* ('slaughter-month'), etc.; (12) *Wintermaand*, etc. The modern Frisian names practically all agree with the Dutch.

The native month-names used in Denmark are as follows: (1) *Glugmaaned* ('window-month'?); (2) *Blidemaaned* ('cheerful-month') or *Göjemaaned* ('giant-month'); (3) *Tormaaned* ('winter-month'); (4) *Faaremaaned* ('sheep-month'); (5) *Mejmaaned*; (6) *Sommermaaned* or *Skærsommer* ('bright summer'); (7) *Ormemaaned* ('worm- or snake-month'); (8) *Hömaaned* ('hay-month') or *Höstmaaned* ('autumn-month'); (9) *Fiskemaaned* ('fish-month'); (10) *Sædemaaned* ('sowing-month') or *Ridmaaned* ('riding-month'?); (11) *Vintermaaned*; (12) *Julemaaned* ('Yule-month').

In Sweden we find: (1) *Thore* ('giant-month'); (2) *Göja* ('winter-month'); (3) *Blidemånad*, *Blida*; (4) *Vårant* ('spring-work'); (5) *Mai*; (6) *Midsommer*; (7) *Hömånad*, *Höant* ('hay-making'); (8) *Skördemånad*, *Skortant* ('reaping-work'); (9) *Höstmånad*; (10) *Blotmånad*, *Slagtmånad* (cf. the A.-S. and Dutch names for Nov.); (11) *Vintermånad*; (12) *Julmånad*.

In Norway a peculiar and apparently archaic calendar has continued in use down to the present time. The first three months are called respectively *Torre* ('giant'), *Gjö* ('winter'), and *Krikla* or *Kvine* (the latter two unexplained). For the 4th and 5th months we find only the name *Voarmoanar* ('spring-months'); for the 6th and 7th, *Sumarmoanar*; for the 8th and 9th, *Haustmoanar*; for the 10th and 11th, *Vinterstid*; for the 12th, *Jolemoane* or *Skammtid* ('short-time'). All these months are lunar. *Jolemoane* is said to denote the lunar month in which Yule (Christmas) falls, provided that it lasts until Jan. 6; otherwise the name is applied to the following lunar month. The Norwegian year is divided into summer and winter. The former begins on Apr. 14, which is called *Sumarmaal*, and the latter on Oct. 14, called *Vetternætter*. This arrangement can be traced back to early times.

In Iceland the first month has always been called *Thorri*, the second *Góa*, the third usually *Einmánaðr* (supposed to mean 'one month' before the beginning of summer). After this there is much variation. *Sáðtíð* (seed-time') varies between 3 and 4, *Eggtíð* ('egg-time') and *Stekk-tíð* ('fold-time' or 'lambing-time') between 4 and 5, *Sólmánaðr* ('sun-month') between 5 and 6. We find also: (4) *Gauksmánaðr* ('cuckoo-month'), *Harpað* (unexplained); (5) *Skerpla* (unexplained): (6) *Sól-*

mánaðr ('mountain-pasture-month'); (7) *Heyannir* ('hay-making'), *Miðsumar*; (8) *Tvímánaðr* ('double-month'?), *Kornskurðmán.* ('reaping-month'); (9) *Haustmán.*; (10) *Gormán.* ('slaughter-month'?); (11) *Frermán.* ('frost-month'), *Ylir* (supposed to mean 'howler,' but perhaps identical with the Anglo-Saxon *Giuli*); (12) *Hrútmán.* ('ram-month'), *Jólmán.*, and *Mörsugr* ('marrow-sucker'?). The majority of these names can be traced back to the 13th cent.; but, with the exception of the first two or three, they do not seem to have been much used.

The Icelandic months are not lunar, but they do not really correspond to ours. The year contained 364 days, *i.e.* exactly 52 weeks, and was divided into winter and summer, the first three and last three months being included in winter and the rest in summer. Each month contained 30 days, except the third month of summer, which had an additional 4 days, known as *Aukanætr*. The beginning of the fourth month, *i.e.* the beginning of summer, fell always on a Thursday, between Apr. 9 and 15 (O.S.), while the beginning of winter fell always on a Saturday, between Oct. 11 and 18. These dates were called respectively *Sumarmál* and *Vetrnætr* (the Norw. *Sumarmaal* and *Vetternætter*), though in each case the name was applied to the first three days. 'Midsummer' proper was the beginning of the fourth month of summer, and fell always on a Sunday, between July 13 and 20, while 'midwinter' was the beginning of Thorri, and fell always on a Friday, between Jan. 9 and 16. Every five or six years, a whole week, called *Sumarauki*, was intercalated after the *Aukanætr*, i.e. immediately before 'midsummer.' The usual method of dating was by the number of the week in summer or winter.

An attempt has recently been made to show that this peculiar calendar is merely a modification of the Julian, determined by greater convenience in the reckoning of Easter. The number of dates on which Easter could fall was reduced thereby from thirty-five to five, while the beginning of summer coincided with the mean date for Thursday in Easter week. It is likely enough that Church influence did contribute towards the fixing of this date, but the assumption on which the theory as a whole mainly rests, viz. that the Northern peoples could not have known the week before they adopted Christianity, can hardly be admitted. According to native tradition, the *Sumarauki* was invented by a certain Thórsteinn Surtr shortly after the middle of the 10th cent., at a time when it was found that the year of 364 days, which was already in use, did not really coincide with the solar year. The week may very well have been adopted quite early in Icelandic history as the standard division of the year, in place of the lunar month. Such a change is probably to be ascribed to the isolation of the settlers, and the difficulty which they consequently found in determining or agreeing as to when intercalation should take place according to the lunar system.

In spite of the great variety of names shown by the above lists, there is yet an appreciable number of cases in which several Teutonic peoples agree in using the same term. These are, as a rule, derived from occupations peculiar to certain periods of the year, *e.g.* 'hay-month,' 'harvest-month,' 'slaughter-month.' Again, there is no doubt that some names have become obsolete in certain countries. Thus in some parts of Sweden the marsh-marigold is called *trimjölksgräs*, which points to the former existence of a month-name corresponding to the A.-S. *Thrimilci*. It has also been suggested that the A.-S. name *Liða* may be related to Old Church Slavic *lěto*, 'summer.' If so, it must be very ancient.

The most important case of agreement, however, is that of Goth. *Iuleis*, A.-S. *Giuli*, and perhaps Icel. *Ylir*; for, though this word is clearly related to A.-S. *Geohhol*, *Géol*, O. Norse *Jól*, it is certainly not a recent derivative from it. The etymology of the whole series of forms is quite obscure, but there is no reasonable ground for doubting the antiquity of a midwinter festival among many, if not all, of the Teutonic peoples. Procopius, writing in the middle of the 6th cent., says (*Goth.* ii. 15) that the inhabitants of Thule (*i.e.* Scandinavia) were for forty days in winter without the light of the sun. When thirty-five days had passed, it was their custom to send messengers to the mountains, and, as soon as they heard from them of the sun's return, they began to celebrate the greatest of their festivals. This story as it stands is difficult to credit, for such a phenomenon could, of course, occur only in the extreme north of the peninsula; but, at all events, it gives evidence for the existence of a festival about the end of the first week in January, *i.e.* at precisely the same time as we find the Yule festival in later days. Apart from the sagas, we should notice especially a passage in the *Chronicle* of Thietmar of Merseburg (i. 9), where it is stated that the great nine-yearly festival at Leire (in Sjælland) took place about the time of Epiphany.

Other festivals were doubtless held at various seasons in the year, and the assumption that uniformity prevailed everywhere is neither necessary nor probable. In the North, however, we hear frequently of two specially important festivals, one at the beginning of summer or 'towards summer,' the other at the beginning of winter. The former may have coincided with the great festival at Upsala, which, according to a scholion (No. 137) in Adam of Bremen's *History*, took place every nine years about the vernal equinox, though this cannot be regarded as quite certain. The latter was doubtless held at 'the winter nights' (*Vetrnætr*) in October. We hear also of religious festivals among the heathen Old Saxons about this time, and the A.-S. name *Winterfylleth* seems rather to suggest something of the same kind. Tacitus (*Germ.* 11) says that the ancient Germani usually held their tribal gatherings either at the full moon or at the new moon, and in another passage (*Ann.* i. 50) he mentions a religious festival which seems to have taken place at a full moon in autumn. It is held by many scholars that the Teutonic year originally began at this time; and, though incapable of actual proof, the view has much in its favour, especially as the ancient Gauls also appear to have begun their year in the autumn.

As regards the interdependence between the festivals, Icelandic custom fixed an interval of ninety days (which points to the lapse of three full lunar months) between *Vetrnætr* and 'midwinter' (the old Yule), whereas the English year would seem to have begun at the third new moon after the beginning of winter. This accounts for the difference between the two midwinter festivals, if we are to suppose that *Vetrnætr* was originally a mean date for the third full moon before the solstice, corresponding to the A.-S. *Winterfylleth*. The Scandinavian Yule may have been shifted from the solstitial new moon to the following full moon, in consideration of the obviously greater convenience which the latter would present in northern latitudes; but this, of course, can be regarded only as conjectural.

LITERATURE.—J. Grimm, *Gesch. der deutschen Sprache*[3], Leipzig, 1868, ch. vi.; K. Weinhold, *Ueber die deutsche Jahrteilung*, Kiel, 1862, and *Die deutschen Monatsnamen*, Halle, 1869; G. Vigfússon and F. Y. Powell, *Corpus Poeticum Boreale*, Oxford, 1883, i. 427 ff.; A. Tille, *Yule and Christmas*, London, 1899; G. Bilfinger, *Das altnordische Jahr*, Stuttgart, 1899, and *Das germanische Julfest*, Stuttgart, 1901; F. Kluge, 'Die deutschen Namen der Wochentage,' in *Wissensch. Beihefte z. Zeitschr. des allgemeinen deutschen Sprachvereins*, 1895; O Schrader, *Reallexikon der indogerm. Altertumskund*

(Strassburg, 1901), *s.vv.* 'Abend,' 'Jahr,' 'Jahreszeiten,' 'Mond und Monat,' 'Morgen,' 'Nacht,' 'Tag,' 'Woche,' and 'Zeitteilung.' H. MUNRO CHADWICK.

CALF.—See BULL.

CALIFORNIA.—Fundamentally the religion of the Indians of California is very similar to that of savage and uncivilized races all the world over. Like all such peoples, they cherished animistic notions, attributing life, intelligence, and especially supernatural power, virtually to all things. Nor did they lack the beliefs and practices of shamanism, which is founded on the conception that certain men, through communication with the animated supernatural world, have the power to accomplish what is contrary to, or above, the events of ordinary experience. As elsewhere, belief in shamanistic powers circled mainly around disease and death, which were generally believed to be not only dispelled but entirely caused by shamans.

In common with the other American Indians, those of California made dancing, always accompanied by singing, a conspicuous part of nearly all their public ceremonies. They differed from almost all other tribes of North America in exhibiting a much weaker development of the ritualism and symbolism which are perhaps the most distinctive feature of the religion of the Americans as a whole. Practically all the approaches to a system of writing devised in North America, whether in Mexico, Yucatan, or among the tribes of the United States and Canada, are the direct outcome of a desire for symbolic religious expression. The California Indians, however, are remarkably free even from traces of this graphic tendency, alike in their religion and in the more practical aspects of their life. In many parts of North America there is a considerable amount of fetishism, not of the crass type of Africa, but rather as a result of over-symbolism. This fetishistic tendency is very slightly developed in California, and that in spite of—or, as an Americanist would more properly say, on account of—the generally rude and primitive condition of culture. By contrast, as actions and visible symbols are here a less important means of religious expression, words, both spoken and sung, are of greater significance.

As an ethnographic province, the greater part of California plainly forms a unit. Two portions of the present political State, however, were sharply distinguished from the remainder in point of culture during the native period, and these must usually be kept apart in all matters that concern ethnology and religion. One of these distinctive culture areas comprises the extreme N.W. corner of the State, in the drainage of the lower Klamath and about Humboldt Bay. The other consists of what is usually known as Southern California, extending from the Tehachapi Pass and mountains in the interior, and from Pt. Concepcion on the coast, southward to the Mexican boundary. The culture of the small N.W. area was in every way, and that of the larger Southern province at least in some respects, more highly organized and complex than that of the still larger and principal Central region, which comprised at least two-thirds of the State, and which, if such a selection is to be made, must be considered as the most typically Californian.

The religious practices of the Indians of California fall into three well-marked divisions: (1) such observances as are followed and executed by individuals, although their perpetuation is traditionary and tribal—that is to say, *customary observances*; (2) individual practices resting upon a direct personal communication of an individual with the supernatural world — in other words, *shamanism*; (3) observances and practices which are not only the common property of the tribe by tradition, but in which the entire tribe or community directly or indirectly participates — in other words, *ceremonies*. After discussing these three divisions of their religious practices, we shall conclude with a fourth section on their mythology.

1. Customary observances. — These are as strongly developed here as farther north along the Pacific slope. This W. coast region thus differs as a whole from the interior and E. parts of the continent, where such observances are usually a less conspicuous feature than tribal ceremonies. By far the most important of the observances in California are those relating to death. Next come those connected with birth and sexual functions. Beliefs and practices centring in the individual's name are of importance particularly in so far as they are connected with the customs relating to death. There are also restrictions and superstitions as to food.

Death was considered to bring defilement, and almost everywhere entailed purification ceremonies. In the N.W. region these were particularly important, and among such tribes as the Hupa and Yurok the observance of this purification, the most essential part of which was the recitation of a formula, was the most stringently exacted religious custom. The method of disposing of the dead varied locally between burial and cremation, cremation being practised over at least half of the State. Air-burial and sea-burial have nowhere been found. Mourning, which consisted primarily of singing and wailing, began immediately upon the occurrence of death, and continued for about a day, although it was sometimes longer protracted by the nearest relatives of the deceased. Among some tribes this mourning commenced with full vigour some time before impending death, often during the full consciousness of the patient and with his approval. Mutilations on the part of the mourners were not practised to any great extent, except that the hair was almost universally cut more or less, especially by the women. Mourning observances were almost always carried further by women than by men. Among some tribes of the Sierra Nevada the widow did not speak from the time of her husband's death until the following annual tribal mourning ceremony. Except in the case of the N.W. tribes, who possessed more elaborately constructed dwellings of wood, the house in which a death had occurred was not used again but was burned. Objects that had been in personal contact or associated with the deceased were similarly shunned and destroyed. The name of the dead was not spoken. Even the word which constituted his name was not used in ordinary discourse, a circumlocution or newly coined word being employed. It is certain that this stringently observed custom has been a factor in the marked dialectic differentiation of the languages of California. In N.W. California even the accidental mention of the name of the dead could be compensated for only by the payment of a considerable sum. Some property and food were buried with the corpse. The idea that the articles were for use in the world of the dead was not so strong a motive for such acts as the feeling that the objects had been defiled by association with the dead, and the desire to express sincerity of mourning.

On the whole, the immediate observances of death pale in importance before the annual public mourning ceremony, which is everywhere, except in the N.W. region, one of the most deeply-rooted and spectacular acts of worship.